COMPUTERWORLD

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ABM Computer Advisors in Interest Conflict?

By Joseph Hanlon
CW Staff Writer

WASHINGTON, D.C. – A majority of the advisors for the Safeguard Anti-Ballistic Missile (ABM) computer systems come from computer companies that have, or hope to get, ABM contracts.

"This is like asking Ford employees for an objective appraisal of the Edsel," charged one ABM critic.

The group is the National Academy of Sciences Advisory Committee on Data Processing Systems for ABM Defense. It advises the Army on computer systems for both the Safeguard and for more advanced ABM systems now being designed.

The committee presently has 11 members, seven from the computer industry and four from universities.

Five companies presently represented on the committee have a direct interest in the ABM: IBM, Computer Sciences Corp., RCA, and Westinghouse all have multimillion dollar ABM contracts and the Univac Division of Sperry Rand developed the main control computer presently being used in the Safeguard.

One member of the committee recently left Systems Development Corp., whose primary business has been in the aerospace field.

Two of the four universities represented also have an interest in the ABM. The University of Michigan does $200,000 per year in ABM research, and the Georgia Institute of Technology does aerospace research.

Previously 3/4 Industry

The composition of the committee is changing, however. Earlier this year, it had 12 members, nine from the computer industry. Two industry members, both of whom work for ABM contractors – Westinghouse and Control Data Corp., left the committee earlier this year, and one university professor has been added to the group.

The present chairman, Bruce Arden, is from the University of Michigan. The previous chairman,

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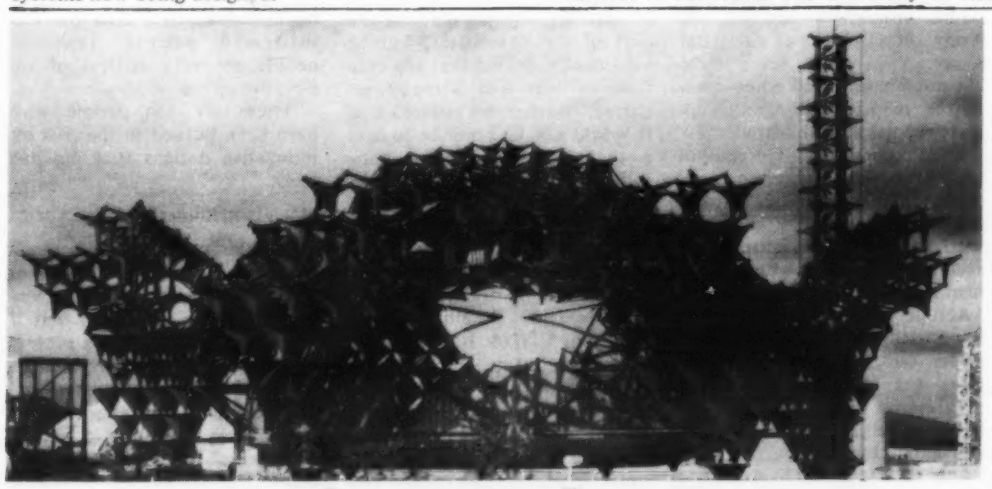

Computer Expo

Designed by computer, the Toshiba Electric Co. pavilion of 1,338 tetrahedronal metal units welded together and supporting a global theater is only a small part of the strong computer emphasis at Expo '70. See CW's coverage of the World's Fair – Page 8.

Costlier Protection Hits Campus Centers

By Phyllis Huggins
CW West Coast Bureau

LOS ANGELES – California campus computer centers come under unfamiliar controls as concern grows that the centers are becoming a symbol of the "establishment" to militant groups.

Stanford University, scene of much recent unrest, moveover has declined to disclose its new security arrangements. Professor Norman Nielsen said: "Then they would know what they have to beat. You can be sure, however, that we have done things to improve security."

Move Off Campus?

The university looked into the possibility of moving the center off-campus but of 32 insurance companies contacted, 31 refused to even consider insuring it.

One company said that if the university instituted a 24-hr guard and other safeguards, it would "talk about it."

The center is now insured under a blanket policy that covers the entire campus. Even this presents difficulties in today's emotional climate as the university has to self-insure itself for the first $500,000 of damage and rates beyond that have risen considerably.

The center has had only one incident, when a fire was started in a small room and did $500 damage.

Dr. Ward Sangren, coordinator of computer activities for the University of California, said that they have been relatively trouble-free, with only a broken window or two.

Full Time Guard

However, he said that the tense Santa Barbara campus now has a full-time guard. The two centers at Berkeley and UCLA have security protections that require everyone entering the center to be identified by a special card viewed through a small peephole.

Sangren noted that the nine campus centers are of necessity more open as they are part of campus/student life with a few hundred to over a thousand students using them.

They have taken some protective steps such as replacing windows with nonbreakable glass.

Members of the most militant campus groups, Sangren said, are

(Continued on Page 4)

Univac I Relic ... $110

Bargains Go Begging at Auction

By Harvey Elman
CW Staff Writer

NEW YORK – Bargains went a-begging at the first, but perhaps the last, major auction of computer hardware held here last week at the Parke-Bernet Galleries.

Approximately 20% of the lots went unclaimed and many others sold at "much-lower-than-expected" rates.

Three IBM 1401s sold for $750, $1,500 and $1,600 – a 1441 for $2,500.

An IBM 7094 was passed by the auctioneer at $15,000.

An IBM 7072, and the Univac 1107 were two other major machines passed over at a fraction of their original cost.

A 7070 brought just $2,250.

Control Panel

The only item similar to the antiques usually sold by Parke-Bernet was a Univac I Control Panel which went to Comdisco, of Des Plaines, Ill., for $110. It will be used as an office decoration.

The consignor was a New York DP manager whose wife wanted "that mess out of the laundry room."

An IBM 360/20 12K card system which originally cost $117,000 sold for $52,500.

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Fiscal Blahs? Bad Bang/Buck Ratio? See Your Friendly Used-Computer Man!

By Peter F. Carr
and Michael Merritt
CW Staff Writers

Buying or leasing a "previously owned" computer is not a panacea for DP managers, but it does give an astute – and lucky – manager a possibility of getting the company controller off his back.

The cost of a desirable or rare machine – such as the 7094, a 360/25, or one of the large 360s – may be over 50% of the original price, but in some cases a machine can be obtained for as little as 4% of its original price.

The rule of thumb seems to be to deduct 10% of the original price a year for depreciation until you reach the 30% level, and guess at an average cost of 30% after that.

But the used computer market is one of horse traders, so a rule of thumb isn't much help when it comes to specific machines.

A spokesman for Data Automation Services of Dallas said: "A user would pay about $40,000 to $42,000 for an 8K 1401 system .... This is about 12% of the original cost." He also noted: "Dealers don't have any trouble moving a 1401, for instance .... The average length of time it takes to move the equipment is about three weeks."

4% to 40%

National Computer Rental's executive vice-president, Tom McArdle, said: "Cost of used systems range, depending on the availability, the need, and the demand, from about 4% to 40%. Most 1400 series run around 20% to 40% of the original cost. 1440s may be 50%."

Joseph Kirby, vice-president of Time Brokers, Inc., put the estimate a little lower. "Buying prices are down to around 20% of original cost," he said, but added that the price "fluctuates depending on the number available – if there are 20 machines on the market, price will drop, and vice-versa. It's very difficult to put an exact price on used equipment; 20% is about as close as you can get ...."

Kirby summed up the broker's viewpoint. "It does not pay any-

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Bureau Fails, No Backup, Late Pay

Washington Airport Shuttle Crippled by Driver Strike

By Edward J. Bride
CW Staff Writer

WASHINGTON, D.C. – Some reportedly unpaid bills snowballed into massive inconvenience for many of 30,000 daily travelers using the capital's two major airports recently and much of the blame was mistakenly placed on the computer.

Hundreds of travelers were delayed in sweltering noon heat when late paychecks led drivers for a company that has an exclusive shuttle franchise to walk off the job.

What was typically reported in the daily newspaper as a "computer foul-up" and a need for "computer technicians . . . to unravel the programming" was really the business failure of a computer service bureau.

At the center of the problem was the bankruptcy of Wesco, the bureau which performed the payroll application for Greyhound Airport Transport, which shuttles travelers from downtown to nearby Washington National and not-so-nearby Dulles International Airport, in McLean, Va.

All of some 700 drivers for the shuttle company, a subsidiary of Greyhound Corp., walked off the job when their hand-prepared paychecks were delivered 40 minutes late on July 23.

Thousands of regular customers knew nothing of the problem, and had to be herded into groups for taxicabs or busses.

A company official termed "ridiculous" the charge that many of the checks did not include overtime. Accountant John Prosek said that "overtime was included for everybody that had earned it."

Asked if the wildcat strike was simply the result of the late delivery of the paychecks, Prosek hesitated, then replied in the affirmative.

Another Greyhound employee noted that the only backup to Wesco's automated payroll processing was "human hands, and of course, that takes time."

Prosek indicated that the problem lay in the repossessing of a paper tape converter by one of Wesco's creditors.

A way of bypassing the paper tape had to be devised and, having no success, manual computing and processing of paychecks had to be used.

The strike ended the same day, but those who were on the shift – all the company's 750 drivers except off-shift workers and vacationing drivers – were "docked" a day's pay for the work walkout.

ABM DP Advisors in Possible Conflict of Interest?

(Continued from Page 1)

however, came from CDC.

Roy Nutt, one of the committee members, is vice-president and co-founder of Computer Sciences Corp., which is presently working on three ABM contracts worth $3.5 million.

New Control Computer?

A major question now being considered by the Army Safeguard Command and the committee is whether to replace the present specially built Univac control computer with an "off-the-shelf" commercial computer.

The Safeguard Command recently paid $1 million to CDC and $774,000 to IBM to study the question. Both companies were represented on the committee when the contracts were awarded, and both companies (plus Univac and RCA) would like to have their computer selected for the job.

Asks 'Is It Realistic?'

The committee advises the Army on all phases of the ABM computer program. Its reports are not binding, and when committee members disagree, separate reports are submitted.

When computer subsystems are first proposed, the group considers if they are "technically realistic and sound; if they will work and can be produced," according to committee chairman Arden.

Actual contract awarding is done without committee advice, Arden said, but then the group joins the Army in evaluating progress on the contracts. Arden listed three areas among those considered by the groups:

- Is electronic circuitry up to the proper technological level?
- Are software production and management standards adequate?
- Is there reasonable testing?

Arden: 'No Conflict'

Arden admitted that conflict of interest was possible on the part of the committee, but he vehemently denied that any conflict or bias had actually occurred. Further, he stressed that it would not be possible to have a technically competent committee without industry representatives.

One of the committee's major concerns, Arden declared, "is the current state of technology. If you want to ask what kind of circuitry you should use now, you don't find this expertise anywhere but in the computer manufacturers.

"It is a delusion," Arden continued, "to think that you can find this kind of expertise in the universities, for example. University people could contribute a fair amount of systems knowledge, but as far as current technology, the manufacturers are where the information is."

To Arden, conflict of interest means conflict between manufacturers. He sees no possible conflict between the interests of the computer companies and of the ABM program itself. For example, Arden dismisses immediately the argument that computer companies in general are allied in the belief that large systems will work, and therefore cannot adequately judge such systems.

Rather, Arden declared: "You have to believe that [manufacturers' representatives] are acting as technical people in such a case. Technical people tend to be more skeptical than the less informed people; technical people are very critical of innovative circuitry.

"These are the people who have been burned in the past by innovative designs that did not work."

Members Sometimes Excluded

Possible conflict of interest among the computer companies is of real concern to the committee. Arden explained that if the committee reviews a project of a company represented on the committee, that member excludes himself from those discussions. Also, Arden said, manufacturers' representatives are sometimes not allowed to review projects by competitors.

When it was formed in 1967, the committee had only four members. One problem, however, was that a small committee could represent only a few manufacturers, so some were excluded.

The committee was expanded to its present size partly to "get the broad representation from the industry and alleviate that possible conflict of interest."

'Talking About Defense'

Roy Nutt also denied there was any conflict of interest by declaring: "Let's face it, we're talking about the national defense."

Nutt argued that people should be chosen for a committee like this purely on the basis of competence, without considering who employs them. "Is a man's integrity in question just because he works for a large contractor?" Nutt asked.

The advisory committee is one of over 500 working under the National Research Council of the National Academy of Sciences. Most of the committees conduct studies at the request of the government.

Computer industry members of the committee are: Nutt, Gene M. Amdahl (IBM), Arthur W. Carroll Jr. (RCA), George A. Champine (Univac), Lee S. Christie (formerly Systems Development Corp.), Claude King (Receptors), and George Shapiro (Westinghouse). Charles Nobles (Westinghouse) and Jim Thornton (Control Data Corp.) recently left the group.

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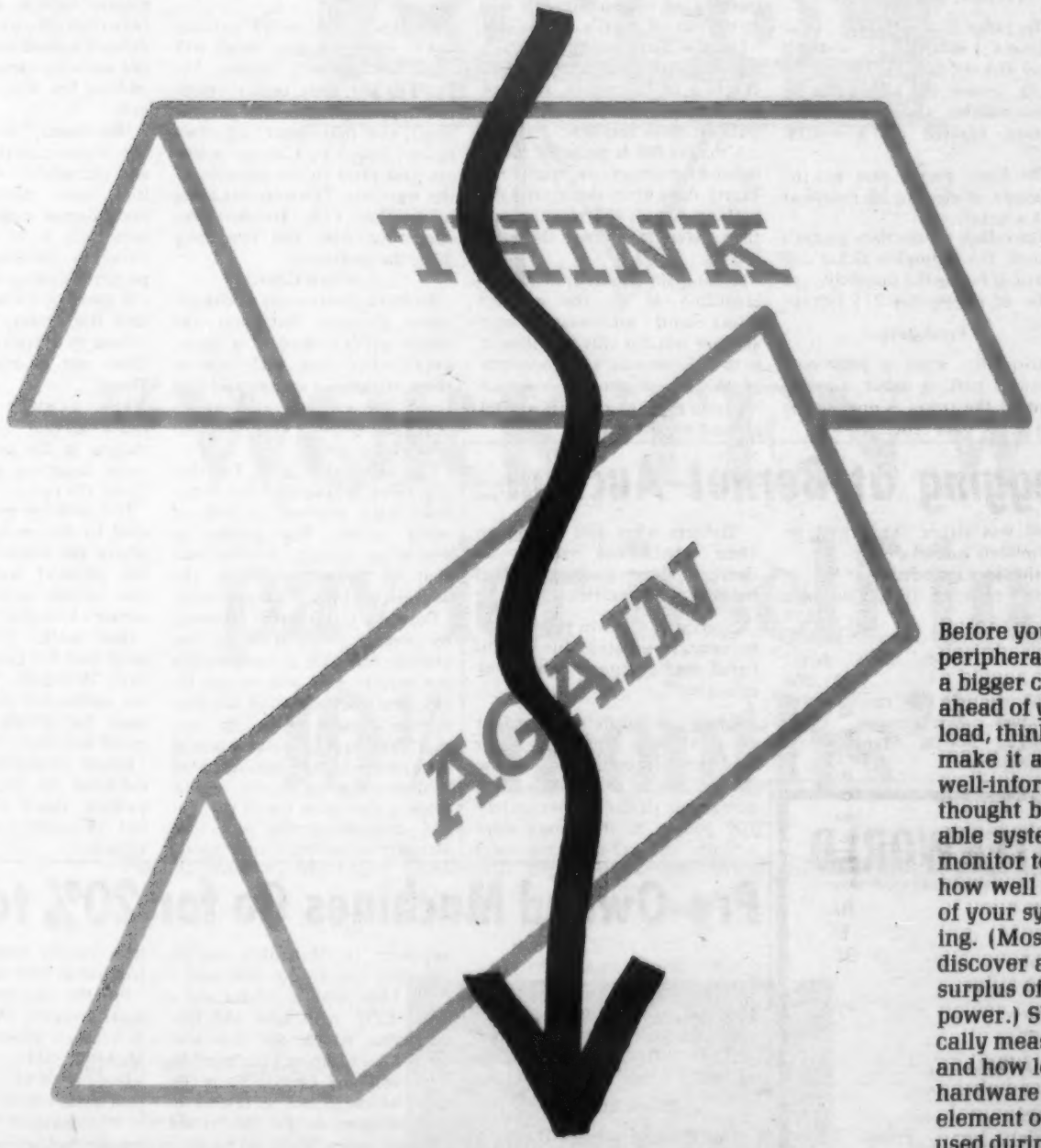

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Traffic Court Computer Exhumes Violators' Offenses

By Thomas J. Morton
CW Midwest Bureau

CHICAGO – The parking ticket is getting an electronic assist here which is making it more difficult for the chronic violator to disregard and avoid paying his fines.

The computerization of the parking violations, according to Matthew J. Danaher, clerk of the Circuit Court of Cook County, was initiated to expedite the processing of warrants for unpaid tickets in the hopes of improving the results against chronic parking violators.

When a parking violator is arrested now, according to Danaher, his whole record of parking violations confronts him in court.

For example, if a man is arrested on a warrant for violations as far back as 1967, all of the actual parking tickets are in the judge's hands when the violator faces him.

Printout of Old Tickets

The judge has a printout of the person's 1968 tickets, and his 1969 tickets, and can obtain the 1970 record by having his license number and current registration entered on a nearby CRT.

The hasty parker now has the privilege of clearing his record at $25 a ticket.

According to the data center's record, the champion ticket collector is facing the possibility, to date, of paying for 215 tickets.

Procedure

Normally, when a policeman writes a parking ticket, a punch card of the ticket is prepared in the police data center here.

A copy of the police punch card carrying the license number of the ticketed vehicle, the date of the violation, and the code number of the violation is sent to the circuit court's data center.

In Chicago, parking tickets have a court appearance date on the face of the ticket, to allow the recipient time to contest the ticket if he so chooses.

A master list is prepared in the court data center, by court date. Thirty days after the court date, parking tickets are run through the system to purge the paid tickets.

Still unpaid tickets are batched, identified as to the owner's name and address against another master file of Illinois auto registrations, and the owner of the vehicle receives a notice reminding him of his unpaid parking violation.

In February, the master lists are run again, purged for paids, batched, run again for the issuance of warrants against the unpaids.

At this point, a $3 parking ticket at an expired meter will cost the unlucky bearer $5. Peter Deuel, data center operations manager for the circuit court, said that about 50% of all tickets issued by Chicago police are paid prior to the issuance of the warrants. The warrants bring in another 15%. Danaher was concerned with the remaining 35%, the scofflaws.

Scofflaw Court

Scofflaw court came about because Danaher felt that the whole process was, in a sense, unfair. The man with two or three tickets a year paid his fines; the chronic violator ignored everything, even the warrant for his arrest.

The habitual violator, Danaher explained, was usually the downtown city resident, a man of many moves. The address at which he actually resided was four or five moves from the address on his car's registration.

Danaher also felt that allowing, by necessity as it were, the chronic offender to escape while the sincere paid was wrong. He felt, and the results of his data section's work bore him out, that the chronic violator would have, since he had demonstrated a disrespect for traffic regulations, a disrespect for all law.

In completing the programs, Danaher explained, some amazing characteristics of the average parking violator were obtained.

The court data center now crosses the list of warranted, unpaid tickets with the latest information on the owner's driver's license record. That record not only includes his current address but also his driving record.

"We found," said Deuel, "that the chronic parking violator is also the world's worst driver. He has more moving violations, more license suspensions and revocations, more accidents with injuries involved, and more property damage accidents."

A study of the results indicated that the average scofflaw is involved in a traffic violation 1.1 times per month, according to Deuel.

The center's equipment is based around an IBM 360/40. Access in the center and in remote locations is provided by 2260 CRTs.

The scofflaw program is operated by the center in a program where the computer prints out the physical warrant for each five tickets ignored, with the owner's location.

One week, 20,000 warrants went out for people with more than 20 tickets. The next week the center sent out 100,000 warrants for people who have ignored less than 20 tickets.

Deuel estimated the revenue collected by the computerized parking ticket program in the last 18 months to be about $5 million.

Bargains Go Begging at Bernet Auction

(Continued from Page 1)

A 360/20 with 4K netted $29,000. A Varian 6201 minicomputer brought $7,000 and an Interdata mini sold for $9,000.

A complete Univac Solid State 80 System, one of the earlier transistorized computer systems, went for $485 – a Solid State 90 for $425.

Most of the punch card equipment was either over-priced or completely passed over.

Other lots included:

- 100 reels of 10-1/2 in. tape $125
- IBM 729 tape drives .. $8,000
- IBM 2402-3 tape drives $22,000

The auction was unsuccessful for two major reasons," commented Martin Stansfeld of Parke-Bernet.

"Bidders were just sitting on their hands and seemed indecisive about pushing further bidding opportunities.

"Secondly, auction prices were necessarily inflated due to inflated used computer equipment estimates."

Sidney Rubinstein, president of IOA Data Corp., a major consignor of equipment at the auction, noted that only a small percentage of the approximately 200 people in attendance were actually the end-user customers.

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Pre-Owned Machines Go for 20% to 40%

(Continued from Page 1)

one to buy a computer from IBM today. The same equipment can be bought for at least 20% cheaper if the buyer shops around."

Who's Buying?

The demand side of the price equation seems to be holding up well. Though perhaps guilty of a bit of boosterism, the brokers generally agreed that they aren't having much trouble selling.

Typical reactions are: "Demand is still very good – but not greater than the supply. Demand is quite heavy. Demand is high at the right price. There is still a great demand for them [1440s] but not much of a supply."

Kirby noted, however, that while "people who know what their plans are for the next three or four years" can find a good deal, there is heavy demand from "people who want to get into computers for the first time .... There is a general interest out there; it's going down to the lower echelons of industry now.

"Small manufacturers and warehousing firms are thinking of getting a small computer whereas before they would never dream of it."

Two Sides

There are two sides to this development, of course. The benefits of EDP are spreading to more people, but a first-time user trying to get by without support from a manufacturer could have trouble.

From the broker's side, a good deal can be done to provide support. In McArdle's words: "Dealers can go out and find a used 1401 with a printer and a good CPU, with tried and true programs which are not unknown and involve little trouble. This will give everything necessary, although not as fast or as sophisticated as the 360 or the Century series."

A first-time user, though, may not know the idiosyncrasies of individual machines; a "neophyte" to EDP really can't judge whether to buy a machine that has programs available only in Autocoder or one that has Cobol and Fortran available.

Nor can a first-time user judge how deeply involved he might become in EDP expenses.

For the experienced computer user, however, the used machine is a much greater opportunity. McArdle said: "A person who knows what he is doing . . . can find some very good bargains.

"For example, a 360 user who needs additional computing [capacity and is running emulation jobs]; it would make a lot of sense for him to review the possibility of bringing back a 1401 disk or tape system, getting it at a good price, and taking the compatible jobs off the [360] . . . and using the 360 as it should be used."

Campuses Add DP Security Measures

(Continued from Page 1)

among the student programmers using the centers. He felt that this was good as they are able to know the kinds of work being done.

There is also the intangible element of esprit de corps which usually infects those using a computer.

Esprit de corps did not help Fresno State College in its recent bombing when Virgil Lewis, the student who allegedly threw the bomb, was identified as one who had been employed by the center for a short time last summer under the economic opportunities program.

Fresno Center 'Symbol'

W.W. Shumate, manager of Fresno ADP, said Lewis was never a member of the team, that the team spirit at his center is excellent, "or we couldn't have recovered as fast as we have." When asked if perhaps the student had a gripe, Shumate said, "No. The center was just a symbol." Lewis has been charged with arson, conspiracy, and possession of explosives.

James Farmer, director of the California State College's division of information systems, said that security at each of the campuses is determined locally but that most of the centers are following the steps taken by Fresno. [CW, July 8, 1970]. Extra precaution is taken, however, at the two regional centers where all tape files are duplicated.

Farmer spoke with some sadness of the problems and expressed the hope that it would not become necessary to separate computer centers from the general campus community.

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Software Patent Discord Hits UK

By J.H. Bonnett
CW European Bureau

LONDON – Computer programs will not be accepted as material suitable for patenting in Britain if the recommendations of the Banks' Committee are accepted. The committee, set up in 1967 under the chairmanship of M.A.L. Banks, has been considering the whole structure of the British Patent System.

At the moment a note issued by the Patent Office in February, 1969, controls the position. This basically says that patents cannot be granted for programs as such, but that novel ways of programming a computer to operate in a specified way could be acceptable.

The committee considered current practice in the U.S. and other countries, and noted that only France has passed *legislation* specifically excluding computer programs from being patented, just as U.S. *policy* formerly did.

Evidence presented to the committee showed that the majority was not in favor of patents for fear it might restrict the use of the computer, a fear now discounted in the U.S.

The conclusion of the report gave four alternatives:

- To leave things as they are.
- To include programs in the definition of patentable inventions.
- To adopt a "non-infringement" solution, which would mean that the Patent Office would make no decision unless infringement proceedings were started.
- To exclude programs from the definition of patentable inventions.

This latter recommendation has been accepted, with the proviso that a watch should be kept on the course of international developments.

Although not a particularly tender subject in the UK it has been expected that the recommendations would tend to follow the U.S. pattern of beginning to accept programs as patentable material.

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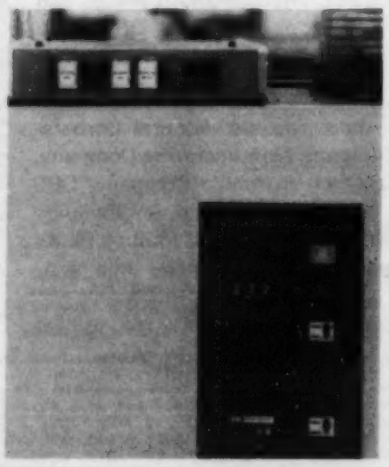

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Psychologist Says

No Computer Fantasies ... Yet

By Phyllis Huggins
CW West Coast Bureau

LOS ANGELES – Computers are given a clean bill of health by a leading psychologist at the UCLA Neuropsychiatric Institute. "In my experience," said Ivan N. Mensh, PhD, head of the Division of Medical Psychology, "computers are not appearing in the fantasies of disturbed people.

"This is in spite of the threats of depersonalization, big brother, and magic brains. I don't know why this is, unless they are still too remote to people.

"They may yet have their role in illness, however. Cartoonists have really taken them up and turned computers into people and cartoonists are ahead of society."

Illness Fads

He noted there are fads in illness. "If you study the history of psychological illness, you find that before the days of radio people imagined thought rays and killer rays.

"After the atomic explosion we had a period of atomic age fantasies. As technology develops different fads develop but the computer has not become one."

Commenting on the medical profession, Mensh said: "On the other hand, my colleagues in the medical field are as upset about the computer as the man in the street.

Doctors Have Phobia

"In a sense doctors have a phobia about computers. They say they are taking the human out of diagnoses.

"I have been in many symposiums about how computers could help them and they all react, 'we don't want to remove the essence of the patient and turn him into numbers.'

"They don't grasp the fact that computers are programmed by people and are just used as aids."

Mensh said the theory that computers contributed to illness by the depersonalization effect of numbers seemed to be unsubstantiated, although students will tell you it is so.

Computers have become the target of student militants and demonstrations, which often have posters reading: "I don't want to be an IBM card," or "Don't fold, staple or multilate me." According to Mensh, however, this is unrelated to psychological illness.

Howard F. Wallach, M.D., practicing psychiatrist, concurs with the observations of Dr. Mensh in that he has never encountered or heard of computers in psychoses fantasy. Dr. Wallach agreed that it is probably because people still know too little about them and have contact with them only through their bills or in other indirect communications.

But Dr. Wallach warned, "When there is a computer in every house connected to a giant computer, we may see it as a psychological illness fad."

No Action Seen This Year on Bill To Control Junk Mailing Listings

By a CW Staff Writer

WASHINGTON, D.C. – There will be no legislation this year to control computerized junk mailings.

Despite urging by Rep. Cornelius Gallagher (D-N.J.) that Congress must "move promptly to protect a person's name from totally indisciminate barter among the computers of profit seeking strangers" [CW, July 29] the House Postal Operations Subcommittee will take no action until next year.

Gallagher was speaking in support of a bill he introduced at a hearing July 21 to consider a dozen bills on the subject. But a spokesman for the committee said the hearings were just for "background information" and that no bill would be proposed by the committee until next year.

Anti-Data Bank Data Bank?

One section of Gallagher's bill would provide for the Postmaster General to establish a computerized data bank of individuals who choose to avoid receiving any unsolicited mass mailing, or who wish to receive only those from charitable or non-profit organizations. Mailers would be required to check this list and comply with the request.

"I stress that this data bank will be in federal hands, because I noted that on June 15, 1970 the industry itself suggested that it was thinking of maintaining a 'Dissident Data Bank' of people who had indicated displeasure with junk mail," Gallagher declared.

"A similar data bank with an even more vindictive title, a 'sorehead' list, was being maintained by the industry [in 1966] and names on it were considered prime prospects for bomb shelters, burglar alarms, and animal repellants," he continued.

The Gallagher bill would also require that each piece of junk mail clearly identify where the sender obtained the name of the recipient.

FBI's Data Gathering Protested

NEW YORK – An anti-war group has charged that the FBI searched confidential bank records to obtain a list of persons opposed to the Indo-China War, and that those names have been entered into FBI or Justice Department computer data banks.

In a suit filed in Federal Court here, the Fifth Avenue Peace Parade Committee contends that the Amalgamated Bank of New York allowed the FBI to search the committee's checking account.

The purpose, according to the suit, was to identify individuals who purchased tickets for transportation to Washington for the Moratorium Day demonstration last November.

Arthur I. Weinstein, lawyer for the group, declared: "We believe that people who sent checks to the committee have been entered into FBI or Justice department computers."

In its suit, the committee asks that the government be forced to delete all of these names from the computer.

Maxwell Branwen, president of Amalgamated, declared: "We did not make any such information available to the FBI." The FBI had no comment.

Several suits are pending against the government to purge information from data banks. So far, none has been successful. In one case, a federal judge ruled [CW, May 9] that the Army has the right to "collect, store, and circulate" information on lawful political activity of civilian dissenters. That case has been appealed.

Baseball Update

NEW YORK – A local television station, which broadcasts the New York Yankees baseball games, uses a computer to update and display player averages during the broadcasts.

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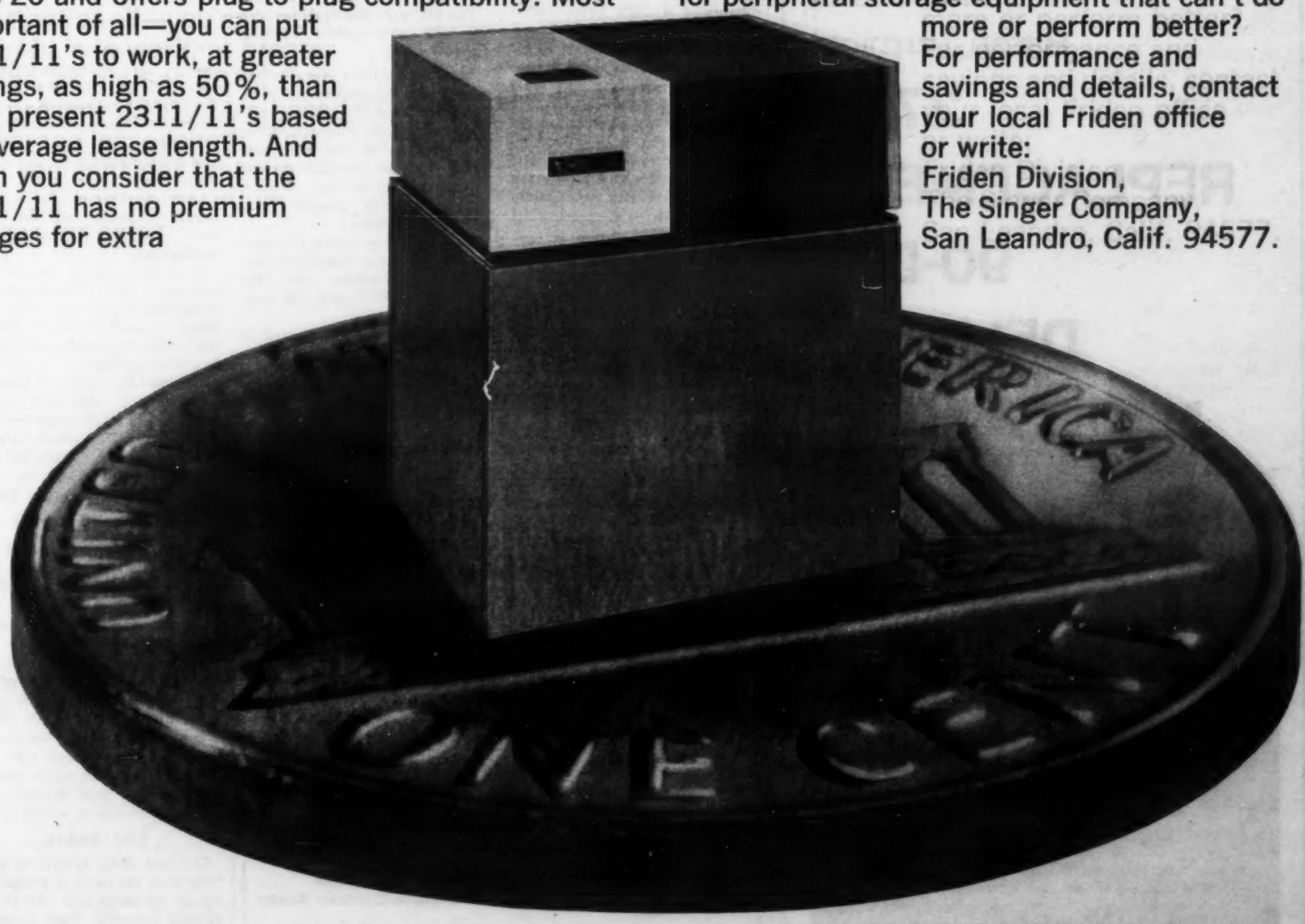

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Computers at Expo '70 - Part I

World's Fair Honeycombed With Communications Links

By Bernice Pantell
Special to Computerworld

TOKYO – The role of the computer in Japan's booming economy can be judged best by its use at Expo '70 in Osaka. And the role of the Japanese systems planners perhaps also can be judged by the attention given to the needs of people in the society projected by Expo '70.

There is a demonstration of concern for mankind's well-being that should bolster the spirits of computer professionals everywhere who are in doubt about the impact of their technology upon the world at large.

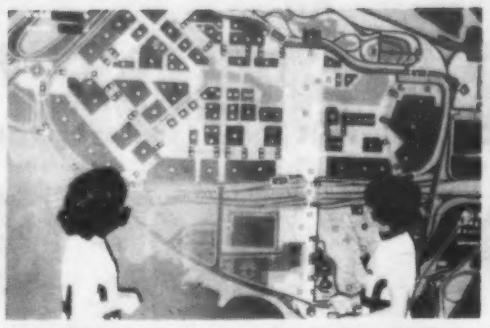
The nerve center is the Expo '70 communications system.

Its heart is the operations control center with two large- and two medium-scale computers providing 100% back-up.

The large-scale computers are Hitac 8500s manufactured by Hitachi Ltd. of Tokyo, each with 262K bytes of core. The smaller two are Hitac 8400s, with 131K bytes each.

This is Part 1 of *Computerworld*'s in-depth coverage of computers at the 1970 World's Fair in Japan.

Briefly, in this part, CW covers the behind the scenes DP operation. In Part II, CW explains the varied "show" applications.



The magnum map shows the density of people and vehicles throughout the Expo site.

Operations control center, where white gloves and slippers are the rules of the house.

These computers share 20 tape drives, 11 disk drives, four 1,250 line/min printers, four paper-tape drives and four card readers.

On-line to these systems are 124 remote terminals with speeds of 240 bit/sec, and 32 1,200 bit/sec CRT display units in English and Kanatani, the Japanese phonetic language.

Also included are two magnum maps, 18 site information boards, 174 light beam detectors, 51 moving load detectors, 52 loop coil car detectors, 14 car guidance signal devices, 100 card telephone devices, and 00 rendezvous telephones.

These 667 on-line remote devices are serviced by 700 communication lines, one pulse counter, eight communication control units and one audio response unit.

The real-time system is augmented by two off-line systems, both Tosbac computers manufactured by Toshiba Electric Co. The Tosbac 7000 controls five display boards that use both English and Kanji, the written Japanese character language.

The Tosbac 5400 does batch processing for internal accounting applications.

This entire system was designed and implemented by a group led by the Nippon Telephone and Telegraph Public Corp. (NTT). Other participants were Hitachi, Toshiba, and the Japan Data Processing Development Board.

They started the project more than three years ago with not much to go on other than general estimates of the number of exhibitors and visitors.

30 Programmers, Two Years

The software was developed by 30 NTT programmers working for two years.

The applications are divided into eight subsystems: gate attendance control, vehicle parking control, site congestion control, exhibition and entertainment retrieval, lost children and property, rendezvous system, water supply control, and message switching.

The operating system consists of four modules: executive, multichannel processor, job (for each subsystem), and file management.

These programs are written in Assembly Language, Fortran (for water and sewage control) and RPG (for off-line reports).

All programs are written in English although there are Kanatani versions of these languages available in Japan.

The communications system has been spectacularly successful and is a model for the city of the future.

It controls vehicle traffic, pedestrian congestion, water supply, sewage disposal and the monorail, as well as providing information at several levels of detail.

Ingenuity and fundamental good planning is evident throughout.

Rendezvous System

For instance, the rendezvous system uses an audio response unit built by Hitachi expressly for Expo. A member of a family or group inputs an itinerary or rendezvous which is accepted and acknowledged by the audio response unit.

Later, another member of the family or group calls the computer and is informed of the rendezvous.

The computer "voice" is pleasant and non-mechanical sounding. Only Japanese language is used but with 98% of the visitors Japanese, that's hardly a shortcoming.

Automobile traffic is handled equally well. Detectors record the flow of traffic and activate automatic signals which redirect the flow to other roads and lots as the percentage of use in a given area reaches upper limits.

Subtle People Control

People traffic is followed just as closely, although no one tries to get people to respond to automatic signals.

Instead, crowded conditions are reported as they occur and visitors are advised of estimated waiting times at every pavilion. The information is on-line.

Standing in front of one of the site control boards, a visitor can plan his move armed with the knowledge of how much time he has and how long he must wait at the pavilions he wants to see.

Lost Children

The lost child system is real-time and produces a computer match of child and parent via remote terminal. Each terminal has a TV phone so that the parent can comfort the child at once despite the distance separating them.

All this and much more is monitored in the operations control room (OCR) in the back corner of the computer center. There is a huge magnum board that pictures what is going on, as well as closed circuit TVs that can see almost anywhere, and CRTs that are used to extract any statistic concerning Expo that is requested.

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Editorials

CPU ID Codes Implemented

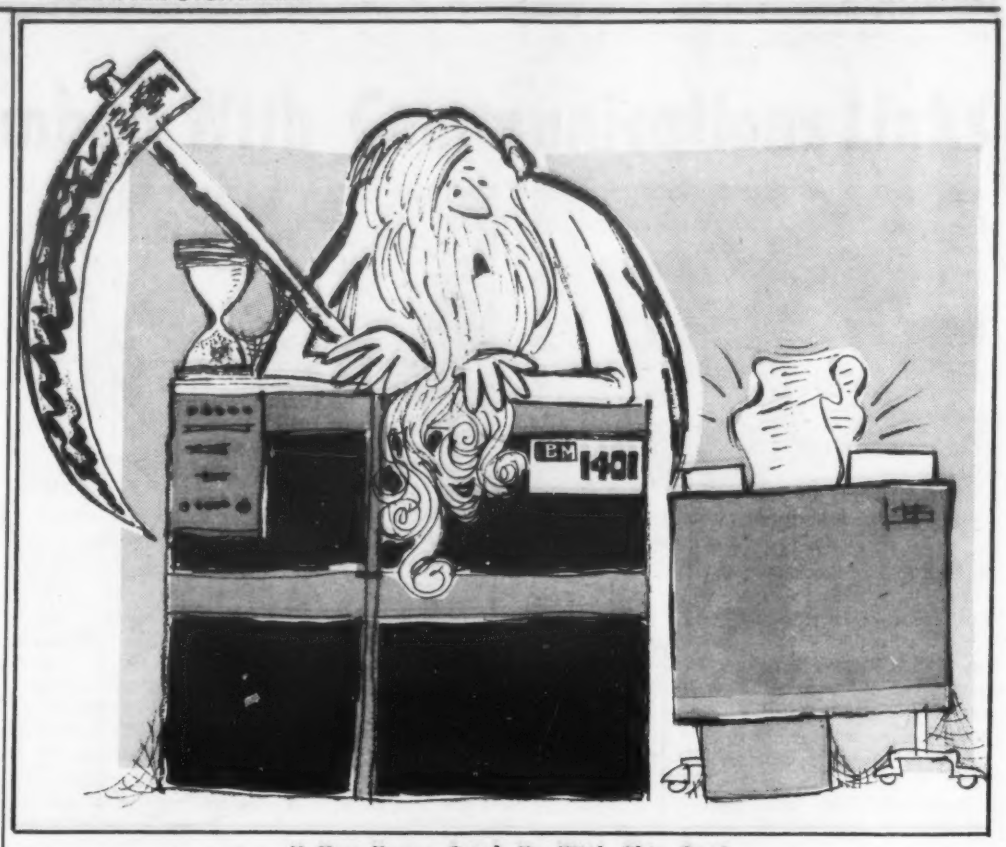
IBM has quietly begun to tighten control over its proprietary software. System/370 CPUs are identified by a unique code which is built into the hardware and accessed through one of the extended instructions.

IBM, of course, stands to gain the most. Each of its software licensing agreements is for one CPU only. Now a program will be able to check the CPU ID to determine whether it is on the right processor.

And independent software suppliers also will be able to insert check routines to make certain that their customers don't cheat.

But what really interests us is that the user is gaining a valuable new security system.

Users will be able to write their programs with a check routine that will prevent them from being run accidentally on the wrong in-house system or cause them to self-destruct if loaded into a "foreign" system. A program could even be written in such a way that if copies of it and its related confidential files were stolen, the program would destroy the files before destroying itself.



'I May Never Catch Up With This One'

Letters to the Editor

UK Corp. Is Keeping Its Scan Service

Contrary to the report by J.H. Bonnett in your issue of May 20, the International Publishing Corp. Ltd. has no intention of disposing of its Scan service either to the Financial Times or elsewhere.

Scan, which was the first time-shared commercial computing service to operate in the United Kingdom, is now a profitable operation and more than 100 stockbrokers, merchant banks and other financial institutions throughout the UK use the existing services. These encompass real-time information retrieval, fixed interest calculations and portfolio valuation. Scan has recently announced a major expansion in which a full range of back office accounting services are provided, thus further confirming our long-term commitment to the Scan service.

For the record, Scan operates as a service of International Data Highways Ltd., which is a wholly owned company within the IPC Group.

W.C. Dunlop
Chief Executive

International Data Highways Ltd.
London, England

Reader Endorses Brandon's Comments

I now understand why Dick Brandon has been successful in his business. His comments in the July 15 issue of *Computerworld* are great! He hit the nail on the head! It is unfortunate that all employees, especially EDP personnel, cannot objectively analyze their roles.

We forget that the user is our customer. That we offer a service and if we don't perform – they may not use our services. If analysts would place themselves in the user's shoes instead of attempting to develop ideal MIS systems; maximizing running time while minimizing the quality of output (which includes user education); and worst of all – the politics that drain the available resources (and the sincere company-minded analysts), they would be better off.

There is no question that EDP has grown too fast – much too fast; which caused management to "back-off" and not get involved, but hopefully the 70s will see management "get involved."

In the meanwhile – it would do us good to accept Brandon's challenge – on every point – plus. . . !

Charles A. Marques
Systems and Procedures Manager

Finch, Pruyn & Co.
Glens Falls, N.Y.

ACM Member 'Struck Dumb' By Cost of N.Y. Convention

Just like many other ACM members, I'm sure, I took no notice of details of the coming New York convention in official publications until the recent mailing of registration information. I was then struck dumb by the information that it would cost me fifty (five-zero) dollars to register for the convention of the organization which is supposed to represent my individual best interests!

Sure it's true that most people who attend are sent by their companies, "which can afford it." But what if I am more concerned with my personal interests than with being a company man, and the company declines to send me? The attitude of depending on the industry to pay for the very admission of members to their own national convention is an undeniable step toward transferring power over ACM away from its members towards the industry chiefs.

Unfortunately, the membership of ACM seems to be dazzled with a narcissistic image of the association as some high-flown body with only the purpose of making them, through membership, Better Type People. While this purpose may be valid, it is also valid to have more base, selfish interests.

During this decade of unbundling and the "software generation," ACM will inevitably be pushed into a position of great political importance, and it is exceedingly important that its individual members not let it be sold to the powers that be.

James Enterline
President

Enterline Automation and Computing
New York, N.Y.

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D.C. Data-Line

New Users' Group Formed

By Alan Drattell
CW Washington Bureau

WASHINGTON, D.C. – There is growing evidence in the nation's capital that a concerted effort is being made to save money – whether it's cutting back on defense spending or trying to use computers more efficiently. Thus, it was no surprise that a new users' organization has emerged for operational level people in government agencies (those equivalent to DP managers, particularly, in private industry).

Appropriately called the Federal ADP Users' Group Capital Region, it is part of a loose

Alan Drattell

confederation of federal user groups in key areas throughout the country. There is no central organization, or a national president. Each group operates independently, with an eye toward interchanging ideas with each other.

The first president of the 125-member Washington-based unit is Col. Harold D. Wolaver, director of automation for the Army's finance and comptroller information systems command. As such he has operational jurisdiction over a computer center that houses two Control Data 3300s and three Honeywell 200s.

Impetus for formation of the capital region group came from the ADP policy group within the government, according to Col. Wolaver. This interagency committee suggested formation of the users' unit to facilitate improvement in ADP operations.

Closer Relationship

Specifically, the users are striving to promote a closer working relationship and better communications among federal installations with a sharing and exchange of ideas, equipment, techniques, applications, programs and routines.

Also on the agenda is a move to standardization in time-sharing in the federal government. "We're going to try to cut back on the reinvention of the wheel," said Col. Wolaver.

The professional development of the individual through organization-sponsored seminars and the like are also on tap.

It is interesting to note that the federal users have chosen to organize outside of the traditional professional associations in the computer field. The one that most closely parallels the federal group is the Data Processing Management Association.

Special Problems and Needs

Col. Wolaver could not explain the reason for this separation, although he did acknowledge the specific problems and needs of the federal users. For example, one is employment. While private companies can go into the open market and bid on individuals they need, federal civilian agencies are glued to Civil Service Commission standards.

Federal user groups, in addition to Washington, are located in Boston, New York City, Philadelphia, Chicago, Detroit, St. Louis, Dallas-Ft. Worth, Denver, Albuquerque-Santa Fe, Salt Lake City, San Francisco, Los Angeles, Seattle, and Portland, Ore., and a new one is being organized in Norfolk, Va.

Saving Hardware Dollars Through Programming

Thoughts on How to Profitably Downgrade a System

The Taylor Report

By Alan Taylor

In most computer installations there is a built-in growth curve. If the current computer system has 200K of core storage then any successor system is expected to have at least 300K. In very economy minded situations it may be possible to keep it down to 200K again, but the idea of bringing it down to 150K is considered impossible.

"The programs will simply not run in the smaller system – so that is not worth considering," goes the argument.

Yet we must consider it, or else we must consider the results of an apparently uncontrolled growth curve. These are the two choices facing installations at the moment: System rentals continue to increase, despite the fact that computer hardware is supposed to be becoming cheaper and cheaper every year.

The benefits of such financial changes are simply not accruing financially to users, and will not do so as long as upgrading – getting larger and larger systems – continues to be the standard and almost exclusive way of user installation progress.

Are Operating Systems Culprit?

The current method of enforcing this one-way growth curve – outside Parkinson's Law – appears to be in the design of operating systems. It is now quite usual for a large operating system to be able to run programs prepared for smaller operating systems (the way the IBM 370 systems will run DOS programs, for instance) but it is quite unknown for it to work the other way around.

This looks very persuasive, and allows the blame to be put on the broad shoulders of the computer manufacturer; but in reality there is often something that can be done inside the installation and which can result in profitable downgrading. This involves a simple preliminary installation analysis, which targets various parts of the hardware for possible replacement by cheaper equipment, and which provides for the necessary resources to be made available within the installation to accomplish the work profitably.

Possible Targets

In this 'Project Downgrade' technique three or four possible hardware targets are selected. Memory is almost certainly one of them. The magnetic tape systems may provide two potential targets – reducing their number or reducing their power.

Random access units sometimes do allow such double targeting where there are a number of different powers of programmatically identical units in the manufacterer's product line.

The random access disks of Burroughs Corp. are one example of this. A user of the 20 msec disks might well want to save money by dropping down to the new 60 msec disks. They are programmatically similar, and financially a lot more desirable.

But by and large the user of random or direct access storage will probably concentrate his attention on cutting down the number of the devices, rather than cutting down the power of the systems.

Price Out Savings

Having created the list, price out the possible savings. Do this over at least a two year period. Reduction of the number of magnetic tapes by one does not save $1,000 – its monthly rental. Much more likely it saves $50,000 – its full capital cost. It certainly saves $25,000, which is its rental for two years.

Alongside each possible saving factor, you will also have a cost-of-saving factor. Using these in conjunction you can come up with a net saving figure – and this is the one that is important. A sample completed table is shown in Figure 1.

The net saving, of course, is simply the difference between the cost-of-saving and the gross savings. Once you have discovered what this is for a particular case, then you know whether it is a first priority target, or whether indeed it is worth doing at all. For instance, looking at the figures in the table it is clear that saving one of the tape units is simply not worthwhile, but that saving a 50K module of core storage is worthwhile.

Watch the Accounting

Now comes one of the harder parts. To make this worthwhile the savings that occur must be allocated properly. Otherwise you will find the firm as a whole doing well, some user department basking in an unanticipated cost cut on their programs, and the computer department being hauled over the coals for exceeding its salary budget!

In order to keep the computing department in the black, even internally, they will have to receive either a lump sum allocation for the task of phasing out the equipment, or else the right to charge by value, or to allocate costs other than on a straight time-used basis.

The programs that are improved, from the efficiency point of view, will be running quicker but this has cost programming and systems time. There is no reason why all the money saved should be immediately given away to the user department.

In the future, that is reasonable. After a year or so it may be practical to drop the rate – but not sooner if the result is to hinder the computer department from achieving and maintaining efficiency, and doing so profitably.

Alan Taylor, consultant, writer, and former editor of *Computerworld*, is president of Computer Management Aids Corp. of Framingham, Mass.

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Possible Equipment Downgrade	Savings Over Two Years	Re-Programming Needs	Re-Programming Costs	Net Savings (If Any)
Reduce Memory by 50K	$50,000	Splitting 3 runs Gaining 1 hr/wk	$3,000 $1,500	$45,500
Reduce Speed of Magnetic Tapes	$100,000	Gaining 20 hr/wk	$60,000	$40,000
Reduce Number of Magnetic Tapes	$30,000	Re-systematize 4 runs	$35,000	None
Reduce Number of Disk Drives.	$12,500	Gaining 4 hr/wk	$6,000	$6,500

Figure 1. Specimen table showing typical types of possible equipment downgrades, together with the method of estimating each item as a potential profitable downgrade. In the specific case shown, although simply reducing the speed of the magnetic tape units appears to be almost as profitable as reducing the memory size by 50K, a look at the comparatively enormous amount of work involved in obtaining the savings makes it clear that memory reduction should be adopted as the first priority target in a downgrading campaign.

Letters to the Editor

'Keep DP Guys'

Regarding your piece in the issue of June 17, *somebody* should be disenfranchised.

The key word, it seems to me, is "unsolicited." The credit card should never have been sent. The charges should be the responsibility of Cities Service, *in toto*.

There must be a chortling demon somewhere in that company's sprawling marketing organization who thinks that sending unsolicited cards is clever. He should be canned post haste, with no references.

Then management – if any – should step up to its responsibility. Does that management recognize its responsibilities – as in pollution? We can safely doubt it.

Then our Post Office Department should ban mailing of unsolicited credit cards – *with* penalties!

Let's keep the DP guys for awhile.

J.F. Moynihan

Chicago, Illinois

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Company Gives Up Data Privacy Fight, Will Turn to Congress for Legislation

NEW YORK – The rights of the Internal Revenue Service take precedence over the right to privacy, according to the U.S. Court of Appeals and recently confirmed by the firm that has given up the legal fight to keep its files "private."

The court ruled that the IRS has the right to see computerized credit bureau data, and dismissed the claim of TRW Credit Data that such access was an invasion of privacy and was contrary to the purpose of the files.

Most credit bureaus cooperate with the IRS, and provide an estimated 25,000 reports a year. But Credit Data, the country's largest computerized credit bureau, has been fighting the IRS for the past two years. Last month, Credit Data announced that it had given up the legal fight and is not planning to pursue appeal of the court's ruling, but would instead concentrate on getting Congress to pass new legislation.

In his ruling earlier this year, Chief Judge Lumbard declared: "The government has the right to require the production of relevant information wherever it may be lodged and regardless of the form in which it is kept [e.g. in a computer]".

The judge continued that it was sufficient that the IRS needed information on the net worth of a taxpayer, and the data need not be "solely for criminal prosecution."

Reduce Possible Harm

Anticipating by several years the present criticism of credit bureaus, Credit Data has gone to great lengths to reduce the harm that can be done with its files. First, Credit Data does not file the hearsay data and newspaper clippings which many credit bureaus keep, and second, it only files public record information (lawsuits, etc.) when such information can be kept up to date.

Believing that denial of credit through error can be easily rectified, but that denial of a job due to such an error may do great harm, Credit Data does not allow its files to be used as part of pre-employment checks.

Credit Data restricts access to its files to credit grantors such as banks, department stores, and the FHA. To be sure that such information is only used for credit purposes, it requires that the user report back as to whether or not credit was granted.

As part of this policy, Credit Data refused access to the IRS and other government agencies doing investigations. The IRS summonsed a file June 10, 1968, and the fight was on – but IRS was the winner.

'Baaaaaaa-boo-boo-boo'

Computer in Charge Gives Job Run Progress Reports

URBANA, Ill. – The University of Illinois has installed a computer to answer telephoned queries from students and faculty members on the status of their jobs in the computer center by "talking" to the caller in tones similar to the standard touch-tones of a telephone.

Annually the university's department of computer science handles 300,000 student assignments and 150,000 research projects. The center was swamped with calls requesting progress reports. Previously a tape recording of a list of completed projects was dubbed into an answering device.

This procedure forced the caller to listen to the whole two-minute tape to find out if his job had been run. If he didn't hear his job number, he usually spent time and effort in attempting to find out if his job had been completed after the tape he had just heard had been recorded. The tapes were made hourly.

Now when a query is phoned in, the computer "talks" to the caller in the tones . . . . and with last-second information. The caller, using a standard 12-button Touch-Tone phone, calls the special number that connects him to the computer, punches out his job number digits, and punches a query symbol. The computer replies to the query with combinations of high (2205 Hz – beeee), middle (1785 Hz – baaaa), or low (1017 Hz – boooo) tones which produce predetermined sound-coded answers.

Informative Answers

The answers, tones of different cycles and lengths, can indicate that a particular job has not been loaded (baaaaaa-boo-boo-boo), that the job is in the system (baaaaaa-baa-baa-baa), or that the job has been completed (baaaaaa-bee-bee-bee). The computer will also inform the caller, through different combinations of the sound-code, that the computer center isn't working, the answering service is busy, or the time-sharing is off.

The computer has the last laugh, however, when the caller makes a mistake, such as an incorrect job number to match the query symbol he was assigned. When the mistake is human, the computer just emits "boooooo."

Twelve-button phones are being placed in the computer center and in five locations on campus. Until more direct lines are placed into the computer serving as the answering monitor, the university plans to keep the old tape-recording system in operation.

Ft. Worth Court To Get DP System

FORT WORTH, Texas – The city council here has authorized a pilot project to keep data on persons going through the judicial and penal processes, and to give law enforcement officials concurrent status reports.

The North Central Texas Council of Governments is expected to award the city a grant of $100,000 to initiate the computer project.

City Manager Howard McMahon said the resultant system should improve court scheduling, while pinpointing problem areas in the criminal judicial system.

Canton's ASR28 terminal in its unopened crate.

Mass., Wary of Critics, Quiet on Police DP Net

By Edward J. Bride
CW Staff Writer

BOSTON – Remember Harry Truman, and his two famous mottos: one about the heat-in-the-kitchen, the other about the dollar bill?

Well, the heat in the Massachusetts DP kitchen is indeed hot, but the state chooses to stay in that kitchen.

And rather than passing the buck on transition or utilization problems, it sometimes swallows the bitter medicine, or, in at least one case, hides its light under a barrel.

One particular light is the new communications system being used by the various local police departments, coordinating their efforts with Massachusetts State Police, just like the FBI's National Crime Information Center (NCIC).

The barrel hiding the light is simply one of secrecy, under which the system was unveiled and initiated over two months ago.

The "heat" and the "buck" are nearly synonymous: criticism fired at various state agencies and administrators during the past four months.

These offices and officials were criticized for under-use, overpayment, incompetence, and other charges which get hotter in an election year.

So, it is not strange that the Department of Public Safety never really "unveiled" the new law Enforcement Agencies Processing System (Leaps). As one official noted, "Computers have been getting so much criticism here lately, we thought we'd just put the system on line and let it go at that."

Massachusetts thus claims to be the first of the New England states with computerization for law enforcement, and the goal is to install a terminal in every municipality with a population over 5,000.

The computer being used is a Burroughs B5500, and the information in the data bank is much the same as that contained in other state or federal systems: stolen cars, missing or wanted persons, lost or stolen property and securities, narcotics information, and motor vehicle statistics.

The B5500 is on line with the FBI, the state attorney general, Bureau of Probation, and Registry of Motor Vehicles. Over 2,000 miles of cable is involved, with 145 towns having terminals in the first installment.

Unopened Crate

One town, Canton, was recently criticized for having its standard ASR28 terminal in its unopened crate for six weeks. The local newspaper implied that rent was being paid for an unused piece of equipment.

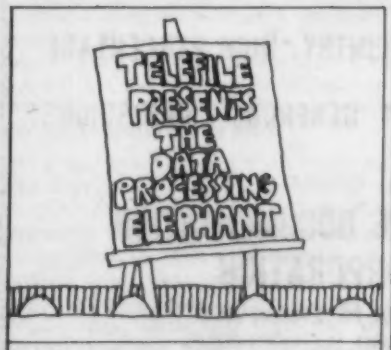
A State Police official stated that the terminals were being delivered as they were completed, rather than storing them in a warehouse for delivery later.

When a "significant" number of terminals are available, then the equipment will be installed and the necessary civil servants will take the eight-hour course in operation of the equipment.

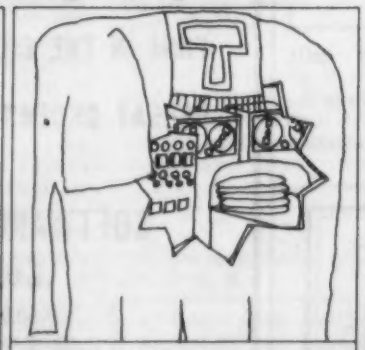
Most large towns went on-line on May 12. The others with the necessary population are expecting implementation "any day now," but at least this year.

The Data Processing Elephant

TELEFILE COMPUTER CORPORATION, 2000 COMMONWEALTH AVENUE, NEWTON, MASS. 02166 **Telefile**



The Data Processing Elephant or "DPE" is a unique computerized file management system of integrated hardware and software.



The DPE can store up to ½ billion characters of data. It retrieves them for you in a matter of seconds. And you don't have to go on a big game hunt to do it. Because the DPE features random access and no sorting.

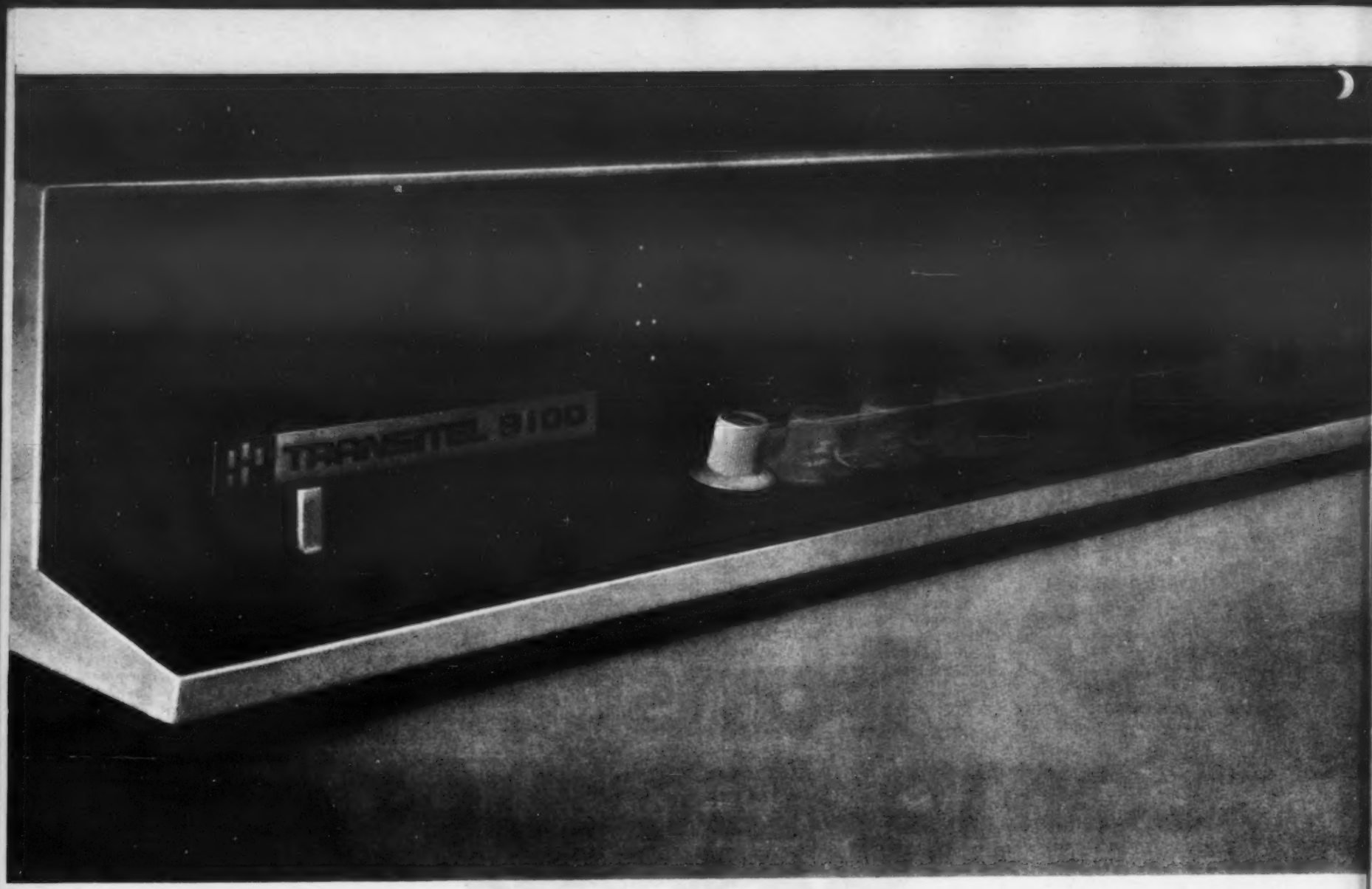
The DPE understands businessmen; businessmen understand the DPE. Because the DPE uses a simple standard COBOL, the common business language, so you don't need expensive computer experts hanging around.

You don't have to be that big a company to afford the DPE. Because it's not that big an elephant. However, when bigger elephants are built, Telefile will build them.

Fact:

Transitel Computer Support Systems are faster. And slower. And more reliable.

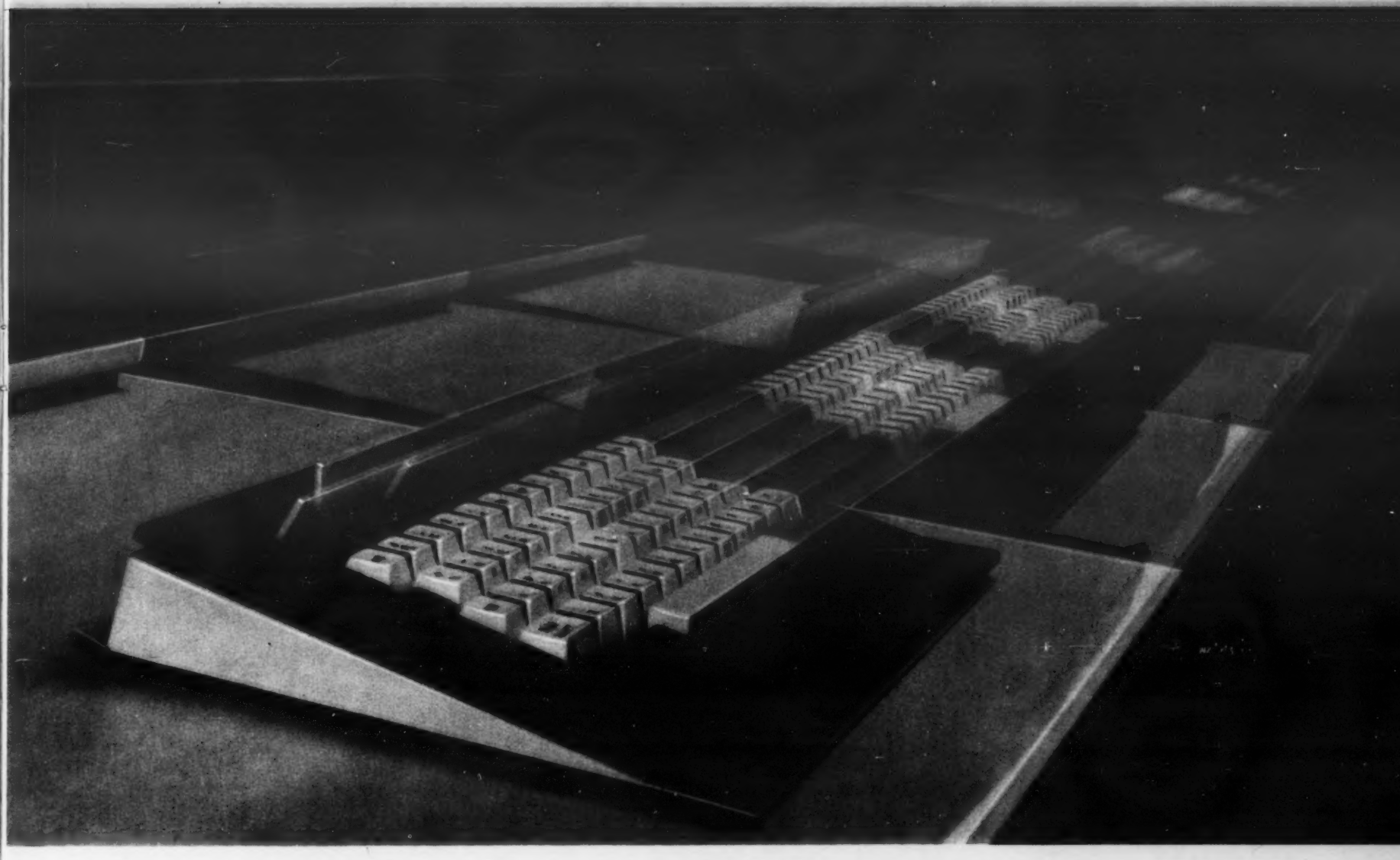
And always more than one at the same time.



Fact:

Transitel Key-to-tape Data Stations are faster to learn... faster in action than Honeywell or Mohawk.

Sorry about that, Honeywell and Mohawk.



These high-performance units demonstrate Transitel philosophy. First, to engineer in more production potential. Then to people-design the equipment so workers can realize this potential... and enjoy doing it.

Consider these Transitel Data Station features:

English display uncomplicates learning. With true character representation, trainees don't have to memorize codes. They can read characters instantly. English display also helps them toward more accurate verification and easier error recovery.

Comfort design increases productivity. Operators appreciate the large work area (over five square feet of desktop), the convenient personal effects drawer, and the added leg room to reduce strain and fatigue.

Plus total tape control. Tape transport sits in upper desk drawer for easy access. Reel-to-reel handling, with automatic tape loading and unloading features, cuts set-up time.

And easy error correction. Operator-sensed errors are quickly corrected by backspacing, then entering the right character.

And flexible programming. Selectable record size (20-240 characters) permits a wide range of data formats.

And computer compatibility. Your choice of 7 or 9 channel ½" tape models, 200, 556, or 800 bpi density.

Transitel Key-to-tape Data Stations. Faster than others. Far easier to learn and use. Complete details in the new Transitel line brochure. Yours for the asking.

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Fact:

Only a Transitel Communicator can be made to talk at half speed... to get you through under bad line conditions.

Just flip our half-speed switch.
It's like turning off the weather.

Under normal line conditions, the Transitel Data Communications Terminal (7 or 9 channel tape models) transmits 1200 bps over Direct Distance lines. Or 1600 bps over private lines. Transmission is error-free and without loss thanks to character, format and parity error detection, as well as odd-even record check.

But what happens under storm conditions? Or any other noise-on-the-line conditions. Just flip the exclusive half-speed switch. Instantly the Transitel Data Communications Terminal slows to a more intelligible 600 (or 800) bps. Which, with Transitel error checks, assures clear, correct communication.

Easiest all the way. Basically an expanded Transitel Key-to-tape Data Station, the Data Communications Terminal can be quickly learned by any office clerk. It offers the proven advantages of English display and easier error recovery for simplest possible operation.

Uninterrupted transmission is facilitated by 10½" tape reels with 2400-foot capacity. And transmission is fast with the Transitel Terminal's large 240 character memory.

Grows with your needs. You can quickly increase the capabilities of a Data Communications Terminal with addition of a Transitel Buffered Data Line Printer. The latter produces reports at remote locations after data has been transmitted from the computer site. An optional 133-character memory allows transmission and printing of most tapes without modification.

Also available for installation: a Transitel Modem. Or, if you like, you can use the externally mounted modem provided by the telephone company.

Whatever the case, you'll find a Transitel Data Communications Terminal the most efficient of all. Under any line conditions. With any operator you choose. Additional facts in the new Transitel line brochure. Free on request.

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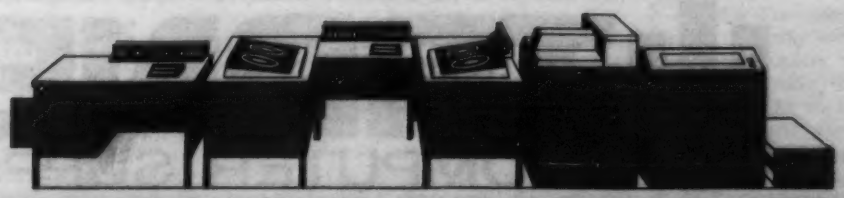

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Transitel service is fast and reliable, too.

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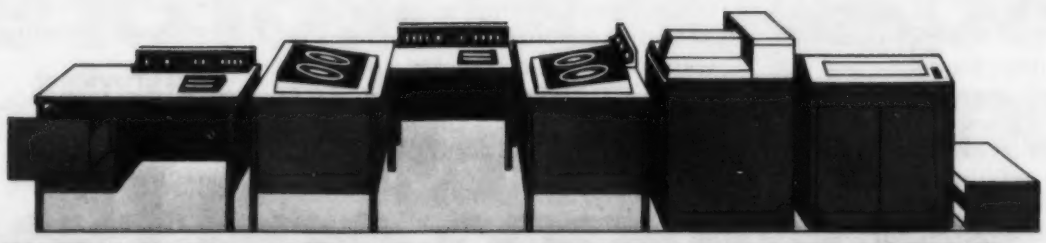

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'Polypac' Allows Source Level Language Conversions

By Don Leavitt
CW Staff Writer

SAN FRANCISCO – Software developers will be able to transform source programs written in one language to a variety of other languages with the Polypac meta-compiler system, according to the developer, Adpac Computing Languages Corp (ACL).

ACL explained that the heart of the system is Polypac itself, which it said is a "neutral" high-level software language that is completely machine-independent.

Functionally, the polypac compiler system has two phases. In the first, the original source language program is read and generated into Polypac.

In the second phase, the program, in Polypac, is again generated, this time into the desired "subject" language, and put out as a source program on tape, disk or cards, at the user's option. The subject language program listing, which is produced automatically, can be suppresssed, the company noted.

Each of the source-to-Polypac and Polypac-to-subject language modules are self-contained. There is no limit, theoretically, to the source-to-subject combinations that can be implemented with such an approach, ACL said.

One user, in close touch with the Polypac concept and development effort, catagorized it as "the solution to the compatibility problem."

The initial modules of the Polypac system are being used by a Chicago bank to transform Adpac programs to Cobol. A spokesman noted that the bank had been using Adpac as its own standard programming language on a 360. It now plans to use Polypac to convert its Adpac programs into standard ANS Cobol source programs for its non-Adpac bank package customers.

Comparisons

ACL claimed that comparisons made on a number of user applications have shown the Polypac-created Cobol programs were "usually as good or better" than corresponding hand-coded Cobol programs.

The current Adpac-Cobol capability is still limited, ACL admitted, in the handling of random access and index sequential files, but the company expects to have modifications available in September to cope with these problems.

ACL added that the next Polypac language modules it expects to implement are those needed for Adpac-to-Ascii Cobol processing. Beyond that, the company will probably work on the development of modules for symbolic assembler languages for minicomputers.

Once the mini-oriented modules have been implemented, a spokesman noted, the users of the small machines will be able to use the extended capabilities of the larger CPUs to develop and debug the software they want to run on the minis.

Later Polypac efforts are expected to allow conversion of one manufacturer's Cobol to another's, Cobol to PL/1, perhaps PL/1 to Cobol, and eventually Cobol to Adpac. Implementation of the Polypac capabilities on other than IBM equipment is an area that ACL said it is willing to explore.

The Polypac meta-compiler system is priced at $5,000, including the original source-subject modules, plus $2,000 annually after the first year for program upkeep. Additional language modules are to be priced at $2,000 apiece, the company said.

Adpac Computing Languages Corp. is at 101 Howard St.

Insurance Packages Geared to 360 Users Include Generalized Management Aids

CHICAGO – System/360 users, particularly in insurance companies, can now consider a series of programs and related services from CNA/Insurance.

The packages, originally developed for CNA's internal use, extend all the way from the System for Automobile and Homeowners Information Base (Sahib), useful only for the insurance industry, to the Error System Processing program (ESP), with generalized I/O editing and error control capabilities that can be used by any business.

Aside from Sahib, designed to maintain master files including premium and claims information, the insurance-oriented packages include Mechanized Accounts Receivable System (Mars), a Transaction and Billing System (Tabs), and a Producer Accounting and Commission Transaction System (Pacts).

ESP is said to be able to edit input data for any of up to 999 different error categories, to list the faulty transactions for review, and to post them to a recirculating file for later correction and re-entry into the acceptable data file.

Other general-purpose packages available include: Operations Management and Information System (Omnis), for scheduling, library maintenance, set up and file maintenance; Peripheral I/O Utility System (Pious) which sorts output files and allows operator control of output media; and Tab Inventory Control System (Tics) to provide an inventory report of tangible stock.

Services which CNA said it will provide with every system include clerical and administrative procedures and forms, work standards and monitoring techniques to be used by management in operating the programs, and senior level technical and administrative help in installing the system.

Sahib is written in Cobol F and BAL and requires 154K storage, a disk, a datacell and five tape drives. The company has said that it can modify this, and any of the other systems, to fit a user's machine configuration.

Because CNA is willing to reshape the packages to meet the user's needs, the company said that prices are all subject to negotiation.

The Systems Planning staff of CNA/Insurance is at 310 South Michigan Ave.

FDS System Speeds 360/67 Programming

WALTHAM, Mass. – Programmers working with Fortran G on a 360/67 can experience a 10% increase in program development productivity by using the Fortran Debugging System (FDS), according to the developer, SofTech Inc.

This improvement is related to the interactive and symbolic debugging capabilities of FDS.

With the FDS system, the user must set at least one breakpoint; he may set several and, in addition, carry out other FDS operations. Program execution starts and continues until a breakpoint is reached. Depending on the type of breakpoint, the user may interact with FDS or simply receive requested output.

SofTech said that debugging output can be directed to a disk file, so that extensive amounts of information, when needed, can be saved.

To use the symbolic reference features of FDS, the user must compile several Fortran G debug routines just before the END statement in his source program to be sure that the necessary symbolic reference data is passed to the debugging system when the object program is loaded.

Several FDS facilities are available by virtue of the interface between FDS and the CP/CMS for the Model 67. FDS resides in the systems library as a Text file. It is loaded with a CMS LOAD command, and is activated with a CMS START command.

FDS input files are created by the user via the CMS EDIT command.

Several CMS features remain available once debugging is underway. Input line editing of FDS statements, for example, follows CMS conventions. FDS relies on standard CP/CMS methods to stop a runaway program.

The package may be leased for a one-time charge of $8,000, or for $500/mo. The developer said that, after the first month, 50% of the monthly rent can apply towards the $8,000 purchase price.

SofTech Inc. is at 391 Totten Pond Road.

DEC Operating System for PDP-10 Aids T/S Users

MAYNARD, Mass. – Time-sharing users of the DEC PDP-10 gain enhanced performance of the system's rotating memory with the Time-Sharing Operating System-10 (Tops-10) available from the manufacturer. DEC said that, with Tops-10, installations can handle more users without expanding existing systems or lengthening response time.

DEC claims that the monitor's file service increases system throughput by 400% to 800% by doing seek operations on movable head disks and transfers on data channels in parallel whenever possible. Tops-10 also gives the user uniformly good response by reducing interference from other users, the company added.

The monitor lets installations customize their PDP-10-based system by varying a group of parameters that define how the monitor allocates disk space. "Disk storage system performance can be "tuned" to benefit terminal, batch, or real-time users," DEC said.

In addition, DEC noted, the monitor offers:

- New and improved protection codes, monitor commands, error codes and system programs.
- User storage quota limit.
- The ability to handle additional rotating memories without modification. The operating system requires disk capability.

Available without charge to PDP-10 installations with DEC disk units, Tops-10 costs $10,000 for users of non-DEC disks, the company said.

Management Service Frees Staff for Creative Work

MINNEAPOLIS – EDP managers who want to be free to work on new systems and applications can turn over the maintenance of current systems to a "second generation" facilities management service from Comserv Corp.

Unlike many facilities management plans, in which the EDP operation is taken over entirely, Comserv's Dataday Processing service can be limited to handle nothing but established applications. Used in this way, it supplements rather than supplants the EDP manager and his staff, Comserv said.

A Comserv spokesman said, however, that the service could be extended to include the entire EDP operation, if that arrangement was in the best interest of the client company.

The decision of how extensively a company uses the Dataday service is made after an intensive on-site survey, during which a three-man Comserv team explores all aspects of a prospective client's EDP operation.

From the survey, the client and the Comserv team may even decide that the operation can be handled more efficiently at Comserv's centralized EDP installation than at the client's own site.

Comserv said that when it takes over the day-to-day routine that often holds back an EDP department, it guarantees its performance. With that type of assurance, the company said, the client's own staff can concentrate on creative work, developing and refining new systems.

As each new system becomes operational, it is turned over to the Dataday Processing service for maintennace, and the user's in-house staff is again free to start another project.

None of the present users of the Dataday services were available for comment, but Comserv claimed that reductions of from 25% to 35% in client's costs were possible. This level of efficiency occurs, the company said, becuase the service is geared to the single area of production without being distracted by developmental considerations.

Dataday Processing service operates basically on a cost-plus basis. If Comserv works at the client's location, the company takes over the client's hardware lease and the payroll for his computer operators, and rents the floor space from the client. Costs for operations at the Comserv EDP installation depend on volume, type of work, and processing cycle.

A Comserv spokesman said that there is no charge involved in the initial on-site survey. The service is, for the present, limited to the general Minneapolis area.

Comserv Corp. is at 3950 Metro Drive.

'Newbasic' Handles Mixed Data Types, Complex Math

ANN ARBOR, Mich. – Businessmen, mathematicians and engineers are expected to be heavy users of Newbasic, a new implementation of the Basic programming language available on the Com-Share time-sharing network.

Newbasic is said to be the first incremental compiler which accepts mixed data types, producing programs which execute as fast as those compiled by non-incremental compilers. With this capability, the substantial human factors advantages of incremental compilation are melded with the efficiency and speed of batch type compilation, a spokesman said.

With Newbasic, the user can call upon over 300 functions and subroutines now available in Com-Share's Xtran library by issuing a single statement. In addition, the user may write programs in Xtran, Com-Share's extended Fortran, and call them from his Basic program

A Com-Share spokesman said that Newbasic has extended arithmetic capabilities geared to facilitate the rapid solution of complex computational problems. He claimed that Basic processors typically accept only real numeric data whereas Newbasic is designed to manipulate real, integer, double integer, double precision, complex, and string data.

Newbasic's ability to handle complex and integer arithmetic, multiple data types, and manipulate alphanumeric strings make it an invaluable tool in solving a variety of engineering problems, the company said.

Other Newbasic features are said to include PICTURE format I/O capability and syntactic enhancements that permit a less structured format and more English-like usage in the program steps.

While Newbasic is said to be a completely new implementation, Com-Share said that programs previously written in versions of extended Basic that were available earlier are fully compatible with Newbasic.

The Com-Share network normally carries a $400/mo minimum billing charge, based on $10/hr for connect-time, approximately $.03/sec for CPU-time and $.03/mo per 1,024 bytes of storage.

Plot Generator Prepares Schematics, Other Diagrams to Military Standards

ALEXANDRIA, Va. – Electronic and electrical design organizations with access to a 360/40 and a Calcomp plotter can use the Schematic Plot Generator package developed by Technical Operations Inc.

The company said that the package is designed to produce a full range of electronic drawings to military standards, including schematics, logic and interconnecting diagrams.

Previous versions of the package had been implemented on the GE 635 and the CDC 3400 central processors. According to Technical Operations, the GE 635 version requires about 16K of storage. The new 360 version needs a 22K partition and operates under OS/360.

Purchase price for the package is $18,000. The developer said that it can be leased on a monthly basis for $450/mo.

Technical Operations Inc. is at 205 S. Whiting Street.

Touch-Tone Credit Checking

NEW YORK – Geran Applied Systems, Inc. is offering an automated Touch-Tone telephone credit checking service.

Credit status, credit limit, and credit account numbers can be verified in seconds, according to the company.

Geran Applied Systems, Inc. is at 605 Third Ave.

Multiple Regression Capabilities Added to 'Cypherstat' T/S Service

ANN ARBOR, Mich. – A multiple regression capability has been added to CypherStat, the conversational statistical system available to users of the Cypher-net time-sharing service.

According to Cyphernetics Corporation, the technique used in the CypherStat system produces accuracy far exceeding that of other widely used multiple regression programs, based on test criteria proposed in the Journal of the American Statistical Association.

Measured against the criteria proposed in the article, the Cypherstat technique had an error of less than one per million, a Cyphernet spokesman claimed.

The accuracy of the calculation is coupled with an error checking technique that terminates the analysis when a serious analysis assumption violation occurs, the company said.

The multiple regression technique is one of 35 analysis techniques currently available to Cypherstat users, the company said.

Completely conversational, the CypherStat system is said to require no programming knowledge and can be used with little or no instruction.

Cyphernetics Corporation is at 333 Maple Village Center.

360/65 & 360/67 AVAILABLE

IPS has available for sale or lease a 360/67 system and several 360/65 systems. The 360/67 is available immediately; a short-term flexible lease can be arranged. 360/65 512K systems and CPU's are available for short-term delivery with and without I/O equipment. 360/50 systems are also available for 90 - 120 day delivery. For complete information, including prices and deliveries, please write or call.

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Memorex Communications System Is 2701 Compatible

SANTA CLARA, Calif. – A new communications system from Memorex is said to handle data at speeds two to six times faster than existing equipment at similar costs.

The Memorex 1200 communication system is built around the 1270 terminal control unit (TCU) and 1220 and 1224 modems. It incorporates the previously announced 1240 communications terminal [CW, April 1].

The system is said to enable IBM 360 and 370 users to take advantage of the performance capabilities of the 1240 terminal which is capable of printing up to 60 char/sec. The 1200 system is intended for use in scientific time-sharing and commercial data communications applications, which are characterized by large volumes of data and rapid transmission requirements.

Modularly Expandable

The TCU is available in two models, the 1270, capable of handling up to 96 lines, and the lower-priced 1270-2, which can handle four lines. A modularly expandable device, it is said to be plug-to-plug compatible with IBM 2701, 2702 and 2703 transmission control units and completely compatible with standard IBM communications software.

The basic 1270 TCU provides for the attachment of from 8 to 32 Ascii or BCD format terminals. The base expansion feature and line-set expansion units provide for the extension of the capacity to 96 lines.

Control of Ascii devices, such as the Memorex 1240 terminal, or Teletype models 33, 35, or 37, is provided through the Ascii terminal control logic that is standard equipment.

The IBM terminal control feature provides the logic necessary to handle supported IBM devices, such as the 1050 and 2740-2741 terminals. IBM binary synchronous devices are supported through the synchronous control feature and the synchronous line adapter.

Different Data Rates

The attachment of terminals with different data rates and code structures on the same line is made possible by the Autospeed feature.

The 1270 TCU is capable of supporting up to 96, 1,200 bit/sec asynchronous lines, or a combination of 24, 4,800 bit/sec binary synchronous and 72, 1,200 bit/sec asynchronous lines, simulataneously.

The 1270-2 TCU is said to be competitive in price with the IBM 2701. The unit's maximum configuration may consist of either four asynchronous, or two binary synchronous and two asynchronous lines.

Among the features available with the 1270-2 are IBM terminal control, binary synchronous terminal control, and Autospeed.

Two models of Memorex modems are available as integral parts of the 1200 system. The 1220 is said to be compatible with the Western Electric 103 modem, which the 1224 is compatible with the WE 202.

Prices for the 1270 TCU vary from $1,015/mo for an eight-line unit to $1,770/mo for the 96-line capacity TCU.

The 1270-2 prices range from $700 to $825/mo. The prices include 24-hr maintenance. Not included are the costs of the modems; the 1220 is priced at $10/mo and the 1224 at $15/mo.

Deliveries of the 1200 system are scheduled to begin during the first quarter of 1971.

Memorex is at San Tomas at Central Expressway.

Optical Scanner for Bank Credit Cards Can Replace Up to Eight Keypunchers

PALO ALTO, Calif. – An optical scanner/encoder designed primarily for the bank credit card industry by Data Recognition Corp. is said to eliminate keypunching or key encoding and to speed up throughput and eliminate errors made by machine operators.

Described by the manufacturer as a computer-free device designed to unplug the data bottleneck caused by converting data to machine language, the DRC 700 automatically reads and Micr encodes 4,000 credit card invoices an hour, replacing eight manual operators and their encoders.

Basically, the company said, the DRC 700 reads the account number on hard-copy credit card invoices received from merchants. It then prints this same number in Micr on the bottom of the card. Up to 14 numbers and two symbols can be printed.

The DRC-700 reads 51- or 80-column tab card sets. The weights of documents can vary from 24-lbs. to 110-lbs. The company said that blue or black carbons can be read.

Rescans for Numbers

The scanner features a capability to automatically locate an imprinted account number in either of two positions. If the device doesn't find the number in one location, it can automatically rescan and look in an alternate position.

According to the company, a prototype installation in a bank credit card association has processed work using the sytem for an extended period. These tests showed a net throughput rate of 85% to 90% of the rate speed of 4,000 card/hr.

The company anticipates deliveries the first week of October, 1970. The price of the unit is $80,000. Leasing arrangements will also be made available to customers, the company said.

Data Recognition Corp. is at 908 Industrial Ave.

CW Survey Shows Little Standardization Among Tape Cassettes

As more and more devices using magnetic tape cassettes appear on the market, the user will be confronted with the problem of deciding which cassette to buy. A CW survey has shown that many variations exist with little standardization.

Most of the tape transports currently available use a standard that is based on the Philips design. These types are used primarily for audio instead of digital applications. However, this standard covers only one area of the cassette, the outside physical dimensions.

Since there are no functional parameters covering such areas as reliability, life, etc., adherence to the current standard means only that the cassettes are physically interchangeable. A cheap audio cassette would fit into a transport intended for computer applications, but the results can be disappointing.

Tape Thickness

One significant area where cassettes intended for computer use differ from audio units is in the tape itself. The tape designed for digital recording is thicker than audio tape to prevent print-through.

This phenomenon where the recorded signal penetrates to another layer of tape, is seldom a problem in audio applications where most of the recorded signals are below the level where they would penetrate. Digital data recordings vary from no signal to very high intensity, and so are more prone to exhibit this fault.

One cassette manufacturer has pointed out that although all digital cassettes undergo some level of pre-checking or certification, this is no assurance that the cassette contains precision digital tape.

Digital certification, the manufacturer said, simply means that the tape has been tested and is certified as capable of supporting the packing density prescribed by the certification specifications.

Perhaps more significant are the varying methods of construction found in the cassettes of different manufacturers. Some companies have chosen to use the standard audio type construction and simply relabel the cassette for digital applications.

Other manufacturers have taken the audio design and incorporated certain refinements to improve performance of flutter and skew and tape pack stability.

These refinements may include the use of high quality audio components, or they may include adding components such as hub washers to minimize axial play special roller guides with self-centering spring devices, special selection of pressure pad assemblies, etc.

Ampex Meets Challenge

One company that has spent much time and effort in redesigning the interior of the Phillips cartridge is Ampex. Starting with the premise that the cassette is actually a small tape transport, problems were met in the same manner as a new transport design problem would be.

The reel hubs are attached with precision ball-bearing assemblies to a backing plate which, according to Ampex, is made of a dimensionally stable plastic. A four-point tape guiding system, as opposed to the conventional two-point system, is used to isolate pack fluctuations of the reels, minimizing tape skew as the tape goes over the read/write heads.

The Ampex design also eliminates the need for friction pads, as the tape does not come into contact with the cassette body.

Auricord Unit

Another unusual cassette design is used by the Auricord division of the Scovil Manufacturing Co. Maintaining that plastics are unstable to heat and humidity, especially during the molding process, Auricord's cassette is of metal construction. A novel feature of the Auricord unit is a pressure tab that allows bidirectional tape movement without moving the pressure pad.

The Certron Corp. goes through two separate tape certifications cycles to ensure performance, one taking place before the tape is installed in the device, the other after the cassette is assembled. Fire resistance and diminsional stability are claimed for the Lexan plastic that is used by the firm as the cartridge material.

The interior of cassettes manufactured by Data Packaging Corp. are lined with Teflon cloth, said to minimize friction. Data Packaging stresses cleanliness in the production of their cassettes, with the assembly taking place in a "clean room".

Although set standards do not currently exist for cassettes, organizations such as Ecma, Bema, and Ansi are currently known to be exploring the problem. Until such time, the accompanying chart will provide the user with some idea of what is available.

	Ampex Corp.	Auricord Div. (Of Scovill Mfg. Co.)	Certron Corp.	Data Packaging Corp.	Information Terminals Corp.	K/Tronic Inc.	Sykes Datatronics Corp.
Product	PC800	CM150, CM300, CM450 (all have -1 and -2 models)	Computer cassette	Compute cassette	T Series	Part No. 102-05	Unformatted and formatted cassettes
Maximum Density (bit/in.)	800	800	800	1,200	3,200	1,000	1,000
Tape Length (ft.)	250±5	150,300, 450	290±5	300 and any length wanted	50,150,300	150,300, custom lengths	300
Price (small Quantity)	$9 (250 ft)	$10 300 ft)	$4 to $5 (290 ft)	$4 (300 ft)	$8.50 (300 ft)	abc t (300 ft)	$9.50 (300 ft)

Sycor Terminal Analysis - Part V

Equipment Features IBM Data Systems Compatibility

By Malcolm L. Stiefel
Special to Computerworld

Assuming a Sycor configuration with six source terminals, a centralized data converter and two centralized terminals as well (one with a single cassette, no communications) to complete the network, the system would cost $68,400, or would lease for $1,909/mo, assuming one of the lower-priced communications media is used.

The 2770 emulators cost $8,500 each. The others, except the 1050 emulator, cost $8,100 each. The 1050 emulator costs $7,900, but there is no extra cost for an unattended feature. The 1050 only operates attended, so it wasn't included in this analysis.

A variant on this configuration uses a communications converter in place of the centralized terminal and data converter. In this case, transmission is made directly onto magnetic tape, so the intermediate step of recording on a central cassette is eliminated, and both of the central office terminals are gone.

Six satellite stations and a 1,300-baud asynchronous communications converter cost $62,400; they lease for $16,871. This configuration is cheaper than the previous one, yet more efficient.

Taking this one step further, the terminals can be connected on-line to a third generation computer which has the appropriate I/O capability and a multiprocessing teleprocessing capability, such as IBM's Basic Telecommunications Access Method (Btam) or Queued Telecommunications Access Method (Qtam) programs which operate on the 360 series.

Here, the central data converter is maintained for backup, in case the central computer is down.

Alternatively, the data converter can be eliminated, with the source stations retaining their data on their cassettes until the computer returns to operation.

The system can be implemented in several ways. In one, each source station calls the computer at the start of the day, is given a port, and remains on-line all day, like a time-sharing terminal. This setup wouldn't take advantage of the local storage capability of the Sycor terminal, and it wouldn't use computer time or the communication lines effectively.

A better way would be to have each terminal call the computer at the end of the day, as in the off-line situation, so that the transmission can be accomplished quickly and cheaply. If the source station is unattended, however, then the advantage of having the computer check each message and identify exceptions is diminished.

If the station is attended, transmission can halt until the operator at the source terminal corrects and retransmits an erroneous message, or until he records the message on his second cassette for subsubsequent correction and reentry.

Since two-way communication with the computer is possible, the computer can send error messages (diagnostics) to the terminals to guide the operators in making corrections. The diagnostic messages can be recorded on the cassette along with the original messages sent from the terminal.

T/S Needs Printer

It would appear that the communications-equipped Sycor terminal could be used as a conventional time-sharing terminal. Yes, but it would include the printer in most instances, making it a bulky and expensive ($11,600 buy, $347/mo lease) tool. Other devices, such as the Execuport or the Datapoint 3000, could do this job more cost-effectively.

Viatron's difficulties in delivery of System 21 and its switch to a purchase-only policy have prompted a search for suitable alternatives. In this series, CW examines the Sycor terminal, which comes closest to System 21 in features and also offers users the added capability of interfacing with major manufacturers' computers.

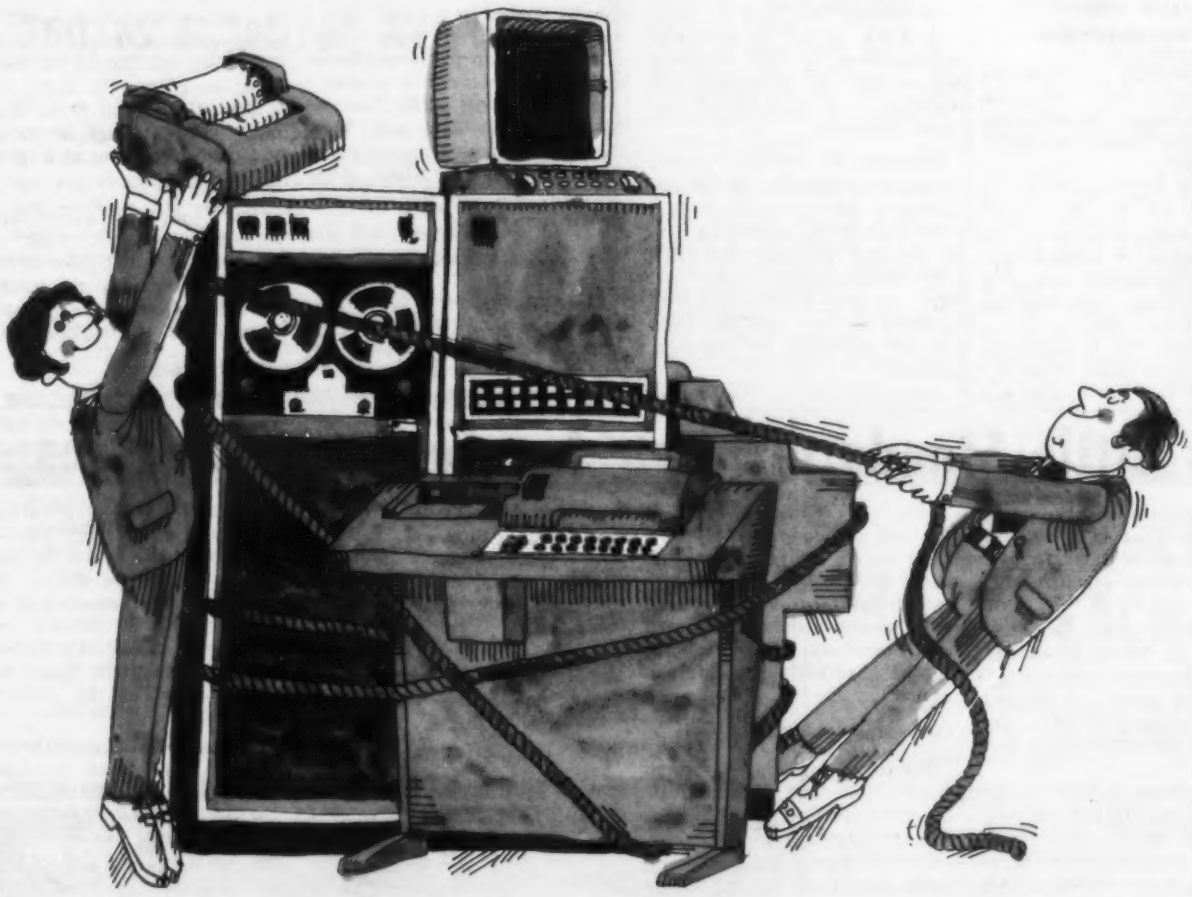
Why the printer? In a time-sharing operation, the user will often want to look back to find something he entered earlier in a given run. If he has hard copy, he can scan it very quickly to find the information.

Some time-sharing terminals attack this problem with video displays that show thousands of characters simultaneously, so that the user can scan several transactions displayed on the screen at a time. If he wants to go back further, he must extract the data from the computer, if it's being stored for him.

Certainly, with Sycor's gear, the previous entries and replies could be stored on the cassette for retrieval, but the retrieval process would be slow. Since only 310 character positions are given on the Sycor terminal display, the printer is needed to supplement the display.

Next week: What do Sycor users say?

Malcolm L. Stiefel is an independent consultant in the area of systems design. He has had extensive computer peripheral experience.



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Send/Receive Modem 'Self-Tests' System

ANAHEIM, Calif. – A send/receive data modem interface pair, featuring DC to 500 MHz bandwidth, parallel-to-serial and serial-to-parallel conversion capabilities is available from Datum Inc.

Standard features include errored frame detection, automatic word-fill entry in the absence of input data, and self-testing of system operation.

The transmit unit, Model 9160, the receive unit, Model 9260, and the system pair, Model 9060, can all operate in any combination of 6, 8, 12 or 24 byte-length window, the company said. Transmit and receiver-out byte lengths do not necessarily have to be the same.

Datum is at 170 Liberty Ave.

Singer Film Scanner Converts Photo to Digital Data

SUNNYVALE, Calif. – Singer's Link Division has developed the APD-2000C scanner, the input unit in Singer's CIM-COM (Computer Input Microfilm-Computer Output Microfilm) system.

According to the company, the APD-2000C is the first, off-the-shelf, high-production film scanner suited for applications requiring the conversion of line drawings and pictures into digital form.

Since the machine can convert graphics into computer language, it eliminates the need for handling drawings for reports manually, while the alphanumeric portion is processed by a computer, the company said.

Input to the scanner can take the form of 35mm film, either in rolls or mounted in aperture cards. The APD-2000C uses a fine spot scanner with a 4,096 by 3,072 matrix to scan an image in 90 seconds. A 5-in. (diameter) CRT is used.

Output is in the form of a bit-stream which can be either recorded on magnetic devices such as tape, disk, or drum, or as direct input to a computer. Interfaces will be provided for any conventional digital computer system, Singer said.

Options available with the APD-2000C include an 8-64 level grey-scale conversion and color scanning. The number of addressable points in the scan matrix can be increased to 16,384 by 12,288.

An optional model of the APD-2000C capable of scanning 4-in. by 5-in. pictures will be available on special order.

the APD-2000C is priced at approximately $170,000 and is currently available on a six-month delivery schedule.

APD-5000

The COM portion of Singer's CIM-COM is handled by the APD-5000. It is primarily a graphics plotter with page-printing capabilities. In can convert computer-generated data into alphanumeric characters or graphical plots which are displayed on the face of a CRT and recorded on microfilm.

Input data can be either from a magnetic tape unit or via direct computer interface. Either 7- or 9-track, IBM-compatible tape units are accommodated. Interfaces for any conventional digital computer system will be supplied by Singer.

Output can be either on 35mm film, giving a plotting area of 1.6 in. by 1.2 in., or 16mm with a plotting area of .77 in. by .58 in. Using a 16,384 by 12,288 point matrix, 100K point/sec can be recorded.

Currently available on a six-month delivery schedule, the APD-5000 is priced at about $108,000.

Six Fortran sub-routines are supplied with the APD-5000 by Singer. For ease of use, each subroutine has four arguments only and utilizes a four-letter designator which indicates its general function – PLOT, NOTE, AXIS, GRID, SCAN, and LINK.

For the vast majority of images, Singer said, only three subroutines will be required.

Also available to the user is a team of programmers and systems analysts who, Singer said, ensure that software is made fully operational on customer computers.

The Link Division of Singer-General Precision, Inc. is at 1077 E. Arques Ave.

Quantum CX Tape Is Back-Coated To Reduce Static

SANTA CLARA, Calif. – Memorex Corp. has available an improved version of its Quantum computer tape. Called Quantum CX, the tape provides improved performance because of a conductive back-coating that is harder than polyester.

The tape is said to eliminate static buildup, a condition that attracts debris to conventional computer tapes. Another source of debris, scratching of polyester base films by tape drives, is also said to be controled by the tougher back-coating.

The new tape, by reducing layer-to-layer slippage, controls cinching, and improves both stacking during rewind and start/stop times, Memorex states.

Quantum CX tapes use the current Quantum magnetic coating, claimed to successfully resist the growth of permanent errors during storage. The surface of the tape is certified to handle 3,200 flux change/in. and 800 bit/in. Dynamic skew is less than 2 μsec, according to Memorex.

Quantum CX prices reflect a 15% to 20% increase over Memorex conventional tape, a spokesman said.

Quantum CX is available packaged in canisters or tape seals. A 2,400-ft reel is priced at about $27. Small quantities are available immediately.

Memorex Corp. is at 1180 Shuman Ave.

Transplotter Stops Cumulative Errors

NATICK, Mass. – A graphic system from I/O Systems, Inc. provides on-line or time-sharing terminal digital plotting at about 20 in./sec.

Called the Transplotter Graphic System, the system receives point-to-point data from data sets such as IBM 2741s, 103s, 232Bs and Teletypes; or directly from minicomputers. No cumulative errors accrue, the company states, because each data ppint is achieved relative to an absolute base location.

High-speed plotting performance is comparable to that of incremental plotting systems, the company said, and data can be edited and formatted for printer presentation simultaneously with plotting of the graphic representation.

The Transplotter system accepts Ascii, Ebcdic, Correspondence, EIA, and Baudot codes in serial form. Fortran IV software is provided to generate axes and chart annotation. The software can be stored in time-sharing systems or compiled for minicomputers.

The price of the system including software, interface, and maintenance for one year is $3,200. A lease, with one-year minimum, is $119/mo, with maintenance, to be provided by Honeywell, at $100/year. Delivery is immediate.

I/O Systems, Inc. is at 32 N. Main St.

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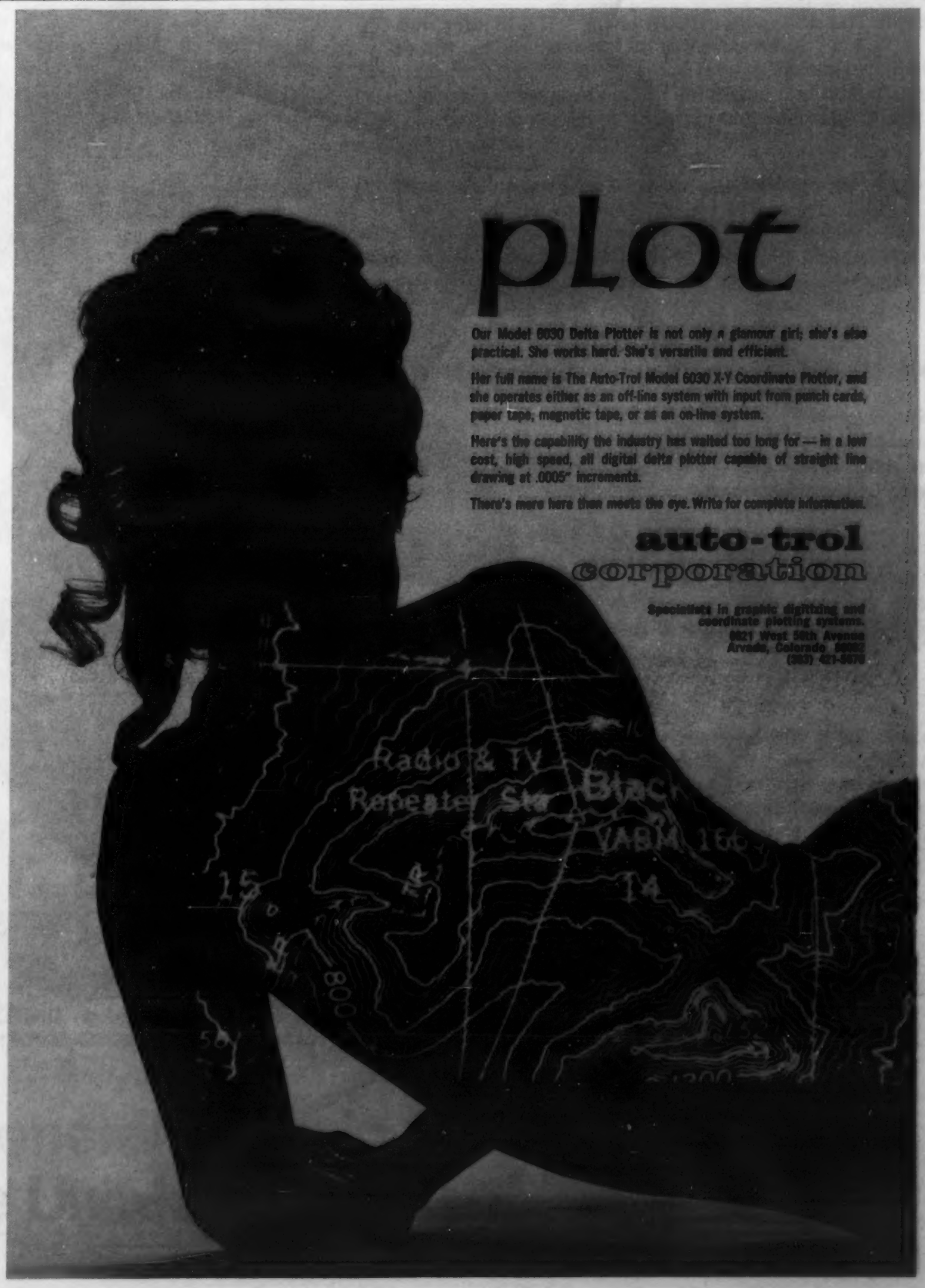
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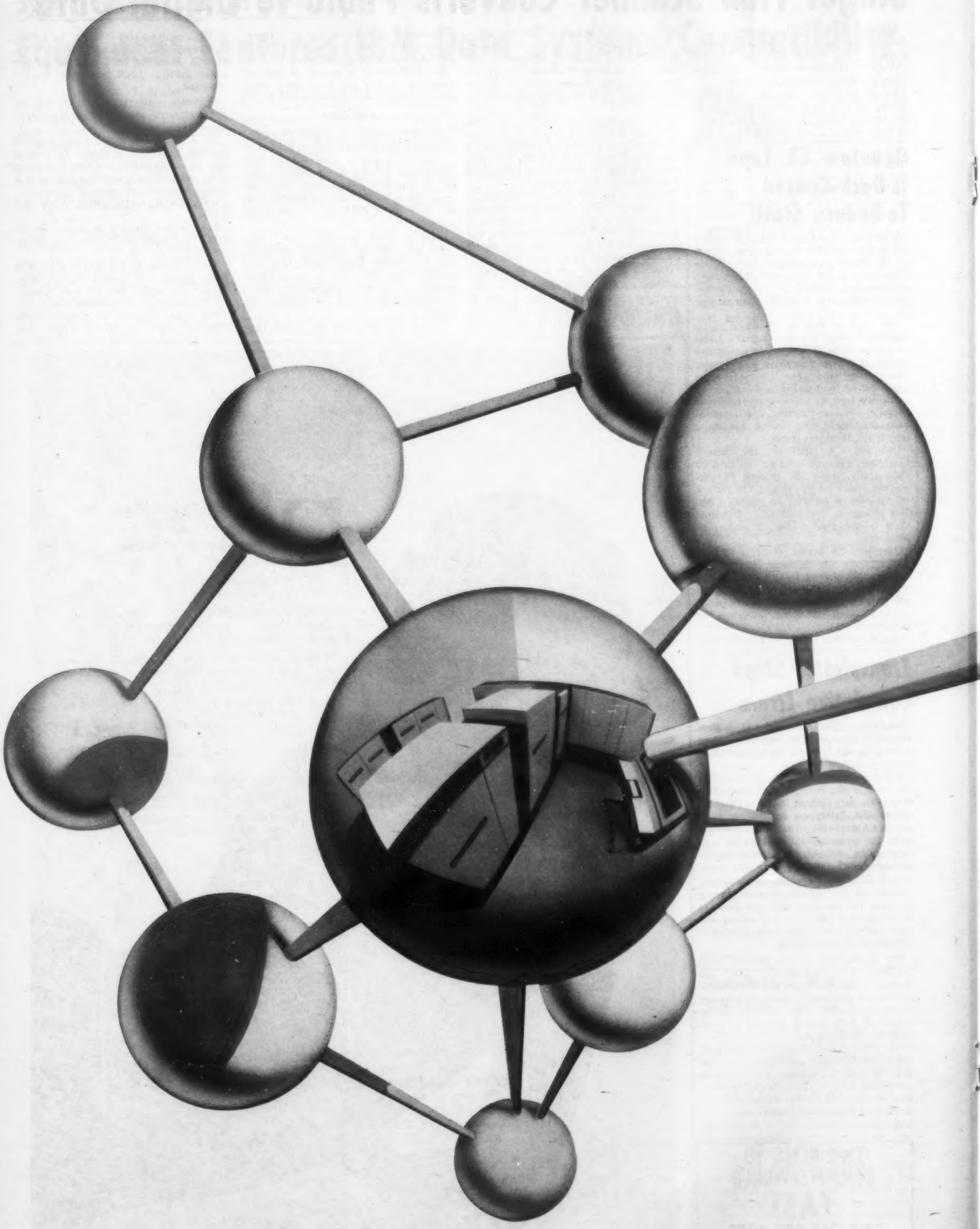


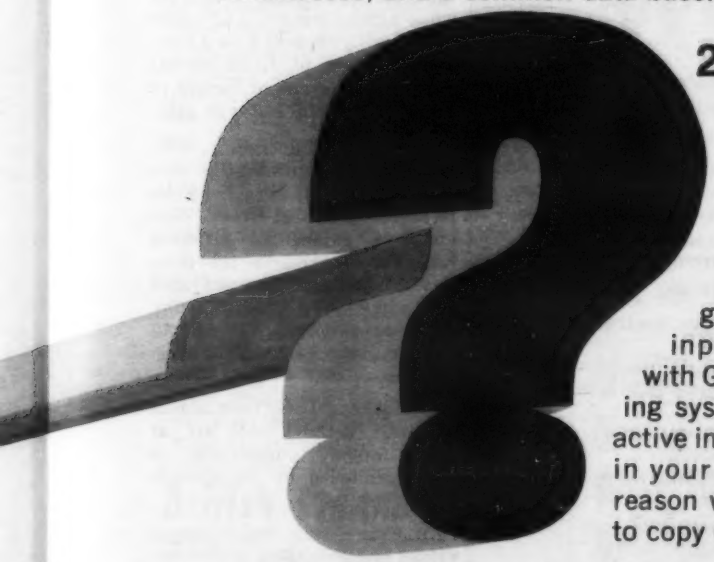
10 questions you should ask about your present operating system ...and about GECOS III

These questions are vital to any user of multiple computer systems . . . anyone struggling to solve the problems of incompatible programs and files . . . any business manager trying to link all his batch, remote access and time-sharing into one common system run from one common data base.

GECOS III* — operating system for General Electric's GE-600 Line of large-scale computers — was first, by years, to meet these problems. And we believe the answers to these ten questions will show you it's still ahead by years.

1. Are you running third generation hardware with a second generation operating system?

"Third generation" means more than just hardware. Operation of a third generation system also demands the capabilities of an operating system like GECOS III — multiprogramming, multiprocessing, three-dimensional concurrent access, and a common data base.



2. Do your $20,000-a-year computer users waste time carrying work to the computer . . . or waiting for results?

They can write and maintain their programs direct from an input/output terminal with GECOS III. One operating system gives them a reactive interface to all software in your system. That's one reason why others are trying to copy GECOS III.

3. Are you adapting your business to your computer? Or your computer to your business?

GECOS III evolved to meet *user* needs. First, it keeps tabs on what your workload is through video system monitoring (VISTA), hard copy monitoring (System Resource Monitor), detailed accounting reports and system simulation. Then, it multiprograms your batch, remote access and time-sharing jobs simultaneously . . . and provides service on demand when you need it.

4. How long does it take to reconfigure your system? All day? Hours? Minutes?

GECOS III adapts itself to any standard configuration. It's truly automatic — the one operating system that matches third-generation software with third-generation hardware.

5. When one module fails, does your system go down?

Not a United System with GECOS III. An on-line test and diagnostic system monitors the central computer's peripherals and communications processors while the system keeps running. Troublesome system modules can be isolated before failure occurs. GE field engineers can then make repairs while the rest of the system runs normally.

6. How many separate file systems do you need to support your business?

Only one central integrated file system with GECOS III. The data base is conveniently accessed by batch, remote batch, or time-sharing programs. You get the flexibility you need to build your own management information system.

7. Can your FORTRAN and COBOL programs talk directly to any remote terminal on the system?

They can with GECOS III's unique remote access capability. Messages are never delayed in centralized message queues. Each message is placed under the complete control of the application system designed to service it.

8. How much does your business pay for time-sharing over and above your normal computer expenses?

GECOS III lets you assign whatever resources you need to support a variable time-sharing load, and to alter those resources dynamically throughout the day. Your users get access to a wide range of time-sharing capabilities . . . plus terminal access to all batch software.

9. Is your system's performance limited by your operators' abilities? Or is the system self-optimizing?

A United System with GECOS III optimizes its own operation by managing system resources and automatically scheduling your work. Your operators get their direction from the system, thus they can help make your operation truly productive.

10. Do you use multiple systems to serve multiple applications?

As a typical example, GECOS III can do all five below simultaneously:

- remote inquiry
- on-line data processing
- batch data processing
- engineering analysis
- text editing

GECOS III is just one of many reasons why a GE United System can help you unite your computers, your people, and your business now. For more information, call your nearest General Electric Information Systems Sales Representative. Or write to General Electric Company, 1 River Road, Schenectady, New York 12305. 290-74

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Users to Challenge Illinois 'Isal' Plan That Would Increase Line Costs 600%

By Don Leavitt
CW Staff Writer

CHICAGO – The Illinois Bell Telephone Co. has filed a proposal here before the state commerce commission to reclassify intrastate computer-linked data communications lines and raise charges to users by as much as 624%.

The rate increase proposal would designate phone lines connected to computers as Information Systems Access Lines (Isal).

In hearings scheduled to begin here Aug. 4, Adapso, Com-Share Inc., Cyphernetics Inc., and others are expected to challenge the Isal proposal as being discriminatory to computer data users.

Illinois Bell spokesmen have told the state commerce commission that calls on computer-linked lines have longer "holding times" and generally make heavier use of the telephone company's switching equipment than calls by the ordinary business customer.

Rates proposed by Illinois Bell for the Isal class users are $30 per line/mo., except in certain "restricted" cases in which $20 per line/mo. would be charged. A spokesman explained that the lower charge would apply to those lines that function only within a user's PBX network, and do not involve central office equipment.

Overall, this rate structure would provide up to a 624% increase in rates for the lines affected, Bell said. Specifically, if the plan is approved, typical monthly charges for data communications will jump from $12.75 to $60 for one user, from $55.20 to $360 for a second, and from $157.25 to $1,080 for a third, Bell said.

In support of the Isal proposal, Bell's chief engineer for Chicago claimed that the average usage of a PBX trunk is about 16 minutes during the busy hour, while the data communicating lines have an average use of 26 minutes per hour.

He noted further that the average holding time on a PBX call was "about 3 minutes," while the average holding time on a data call was "about 19 minutes."

Alleged Drain

To illustrate the alleged drain on central office equipment caused by the longer Isal calls, the Bell spokesman said that while a full-sized No. 5 Crossbar central office would have a busy hour capacity of 7,100 normal PBX calls, it would be limited to only about 4,400 Isal-type calls.

Bell's Rate Supervisor, L.R. Stang, told the commission that the 70 data users expected to be included by Bell in the Isal class are now paying 14 different rates for "essentially the same service" and that they averaged only $4.81 per line/mo, compared to an average of $53.42 per line/mo for PBX lines in Chicago.

He argued: "These lines should produce revenues that are at least roughly comparable to those produced by the average PBX trunk."

An earlier state Isal proposal made by Ohio Bell was withdrawn [CW, March 18] in the face of strong user opposition, before the Ohio Public Utilities Commission made any ruling on the validity of the concept.

The Illinois hearings should provide an opportunity to challenge the Isal concept, which users claim is discriminatory.

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Hiring the Handicapped Maximizes Equipment Usage

By Harvey Elman
CW Staff Writer

NEW YORK – The trained physically disabled computer programmer may obtain maximum usage of equipment, thus producing the most cost-effective operation for the manager.

This is the view of Allan D. Weinberg, executive director of the 52 Association Inc., a non-profit, philanthropic association that has been successful in training and obtaining employment for young, severely disabled servicemen now returning from Vietnam under its "Operation Computrain." [CW, March 25].

The computer industry, in seeking to satisfy its most urgent needs of trained, qualified personnel, "has yet to explore the vast reservoir and market of millions of capable, qualified, and competitive Americans, our physically handicapped, who possess the academic capacity to fulfill the needs of industry, regardless of the severity of their physical limitations," said Weinberg.

Corporation Network

Through the "Operation Computrain" program, the 52 Association has formed a national network of user-represented companies. A comprehensive programming course has been written, combining the expertise, skill, and resources of all participating companies.

Training aids, text, and equipment are provided by the network, and through the 52 Association, which coordinates this project, the program is offered to all patients in military hospitals who score at least a 'B' on the IBM Programmers' Aptitude Test. No limitations are placed on physical injuries.

Upon the successful completion of the training, and the student's subsequent discharge from the military, all graduates are interviewed and employed by the sponsoring network of corporations.

The general handicapped community is much neglected. Millions of handicapped are not located in military hospitals, those called "shut-ins" who are not ambulatory after training and cannot go to a "company shop" for employment. This is where the vast market stands ready to perform.

"I believe the physically disabled but mentally able population, through the use of closed circuit television and the telephone, can indeed be trained in their homes to be qualified programmers. With the use of a terminal, these programmers provide extra manpower from home to meet the needs of industry," he said.

The 52 Association has recently awarded a contract to Computer Learning and Systems Corp., Chevy Chase, Md., to conduct a study on rehabilitation of physically handicapped individuals for the DP industry.

In sponsoring this special study, the association hopes to expand its EDP training activities. The need for vocational training programs for the wounded is greater now than ever before since the Vietnam War has produced a greater number of seriously disabled individuals than the Korean War and World War II combined.

The study will focus on operations relating specifically to computer and peripheral equipment use. Additional data will be provided on computer occupations, physical activities involved, environmental conditions, the selection of trainees, and training procedures. The results will be used to set up training programs at Chase Manhattan Bank of New York and Provident National Bank of Philadelphia.

Operator Duties

Duties of computer operators will be defined; the types of physical activities these operators face daily and the kinds of physical surroundings in which handicapped individuals would be working will be determined.

Since a physical disability usually implies certain functional limitations, guidelines need to be established for selecting trainees who can fulfill, or be taught to overcome, the standard physical requirements of the job.

Ultimate Concern

"The successful employment of the disabled is our ultimate concern," noted Weinberg. Ideally, there should be standardized, industry-wide hiring guidelines for each computer occupation, qualifications for employment, and necessary physical skills to successfully master the occupation."

"Handicapped individuals may still be faced with architectural barriers, but one major concern should be to create a common ground of understanding for people in the computer industry, professionals responsible for rehabilitation training, and the handicapped individual," he said.

British Planning ZIP-Type System, Computer Training

LONDON – Great Britain's post office system plans to integrate into its operations a computerized "teaching machine" that will enable up to 20 operators to be taught letter-coding techniques simultaneously.

Using CRTs and keyboards, the Honeywell 516 will be able to display up to 4,000 different lessons on the screen from information stored in its memory. The system also can incorporate remedial lessons to correct frequent errors on the part of the operator.

This electronic coding and sorting process will be central to the flow of mail through the new British post office system. In processing each letter, the operator will enter, by keyboard, a dotted phosphor for geographical areas. This will facilitate getting letters to their destination faster by funneling them through concentrators, segregators, graders, stackers, automatic facers, coding disk complexes and sorting machines.

The operators first will be taught to touch-type; then to code groups of letters, and to read and code two addresses simultaneously. Stations will be monitored by a postal supervisor who can display his comments to trainees via the screen during instruction. The computer itself presents an explanatory text before each lesson, then performs a critique based on a "par" for the course of instruction.

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Character spacing	.40 character width			
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Character set	64 character ASCII			
Cursor	Non-destructive Blinking underscore			
Refresh rate	50/60 Hz			
Memory	MOS shift registers			
I/O rate	110-2400 BPS standard; High speed serial or parallel optional			
Communication interface	RS 232C or current loop			
Parallel interface	TTL logic, bit parallel, demand-response control			
Power	125 watts, 110-220 volts, 50/60 Hz			
Size	15" high, 17" wide, 27" long			
Weight	65 pounds			

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'Cardiac' Teaches Kids About Computers

SAN JOSE, Calif. – Students at the Clyde L. Fischer Intermediate School have a Cardiac but it's not related to heart trouble. The Cardiac in question stands for Cardboard Illustrative Aid to Computation.

According to teacher Ed Blum, the 8th grade youngsters with Cardiac are learning about computers and programming.

Blum noted that Cardiac, which is extremely simple in design, can be assembled in minutes and is small enough to fit in a briefcase.

The children have discovered that with 10 simple instructions it is possible to program Cardiac to solve simple digital computer-type problems.

Teachers say that surprisingly sophisticated programs – "such as a rocket countdown" – can be given a simulated run-through with Cardiac in a few minutes.

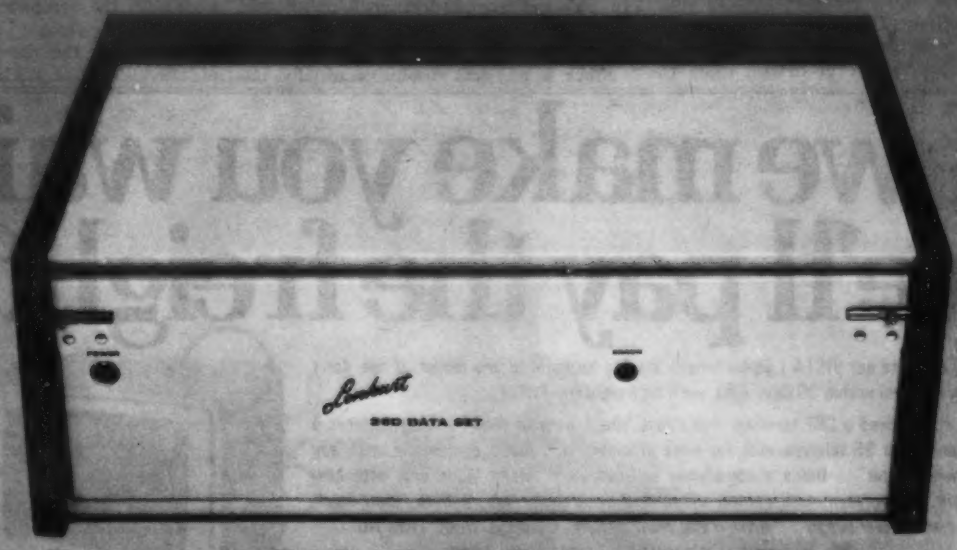
This summer Blum plans to teach the program to 7th graders and possibly 6th graders. Future plans call for actually having the students work on a computer at a computer facility. "Students have the best computer ever to be hoped for – between their ears," he said.

Computer Course Is in Briefcase

STOURBRIDGE, England – Home study "briefcase" courses for programmers and systems analysts are being introduced by Data Processing Services following the recent introduction of a similar kit containing a computer appreciation course for non-computer people.

The main parts of the course are tape recorded, and the tape cassettes are contained together with a recorder, manuals, and data cards in a briefcase. Students can record their exercises and queries.

Designated Computeach, the course would take about one year to complete, assuming about 10 hours a week, and would cost an individual $504. For a school or technical college class of 25 the cost would be $96.



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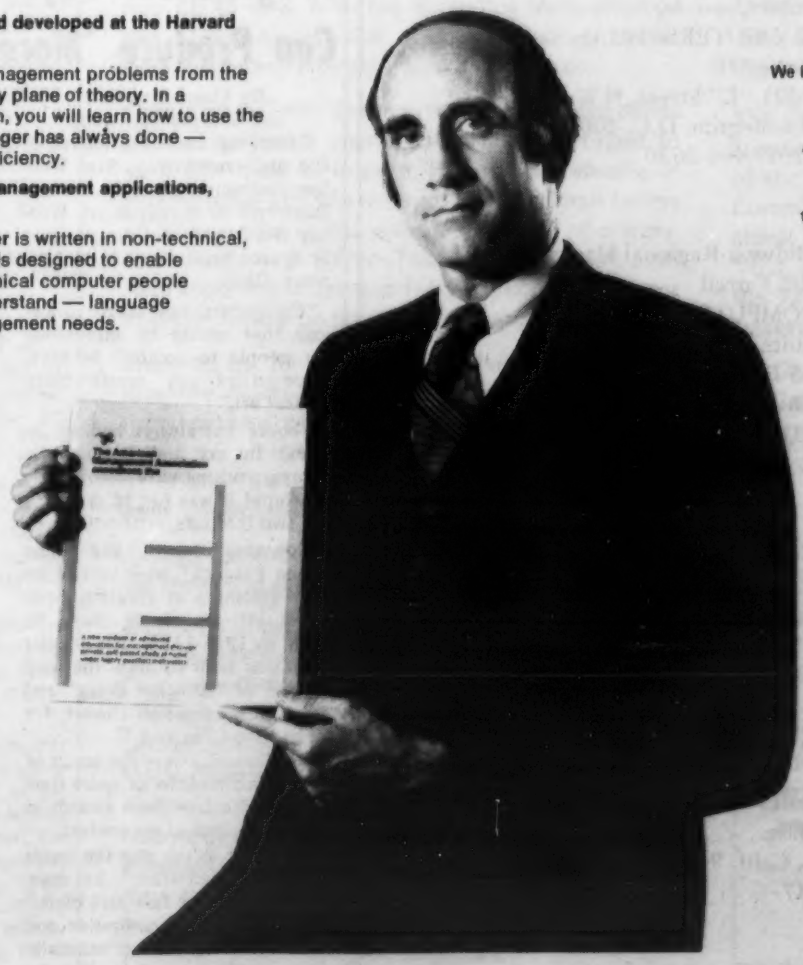

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COMPUTERWORLD

Schools Must Evaluate Raw, Flexible Computing Power

By Harvey Elman
CW Staff Writer

HANOVER, N.H. – The close-minded tendency of school systems to think of educational computing almost solely in terms of complete "CAI systems" rather than in terms of the use of raw and flexible computing power (or some combination of the two) is proving detrimental to students and educators.

This is the view expressed by A. Kent Morton, the coordinator of the Regional College Consortium Project at the Kiewit Computation Center of Dartmouth College, in a recent interview.

"Raw computing power can be tapped for CAI purposes if desired. School officials should be extremely careful to determine precisely what they're buying under this CAI label; the chances are great that what is offered is not exactly what is needed or wanted."

"Additionally, it may be more expensive and more restrictive than raw computing power," he noted.

Master Program

Morton believes that a "CAI system," in most interpretations, places virtually all control of the instructional process in a master program (or several of them), and coaxes the student toward some predetermined goal.

A student's answer is either right or wrong, but the computer is always "right;" so the student is given no opportunity to think or act independently. Morton noted that this could be a very helpful way to approach instruction; but it should not be considered the only way to use computers in education. It should not be regarded, he stressed, as something all schools should strive to achieve.

Myth of Omniscience

To undermine the myth of computer omniscience, a significant amount of the initiative must rest with the student seated at a conversational terminal. "To use a computer as little more than a ready source for stored facts to be presented to students and (hopefully!) assimilated is not only bad education, but a waste of a machine capable of much more than controled regurgitation," he said.

His experiences at Dartmouth College with 40 secondary schools and colleges in New England have demonstrated that students are generally better programmers than teachers, in the sense that they learn more quickly, perceive applications more readily, and write clever programs.

A student participating in the Dartmouth time-sharing system (DTSS) is usually permitted, and even encouraged, to use DTSS for whatever interests him, time permitting.

This arrangement has the educational advantage of encouraging the student to pursue questions of interest to him, rather than simply "swallowing" what is presented to him. Morton suggested that a student should be encouraged to develop his natural interests rather than being forced to learn material he at a terminal. If a student can program a problem, he almost certainly understands it thoroughly, because he has had to reduce it to its smallest logical components.

Morton maintains that learning can be made much more complete when the student is free to manipulate ideas and quantities he doesn't want to learn.

Fooling Around

"Some protestors say fooling around on a terminal is not really learning at all. But isn't it more educational than sitting in a classroom listening to something you're not interested in, or perhaps already know, in the case of some students?

"As it is, students fool around in classrooms anyway, and get little out of it. And sorting out your own problem at a terminal at least makes you think. Or do we just pay lip service to that aspect of education?" he asked.

Computing at Dartmouth, according to Morton, has always emphasized the importance of student control and interaction, as opposed to the passive learning situation common to many CAI systems.

"Too many of these systems claim 'interaction' because the student must type in a brief answer or otherwise indicate a choice when a question is presented to him.

"I don't deny that this qualifies as interaction, but it seems to me that the promotional literature over-emphasizes its value," Morton noted.

This type of interaction, he maintained, left no room for creativity, for formulating personal problems as a result of the lesson and working them out at the terminal.

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Programmer Says Computer, Plotter Can Produce 'More Perfect Art'

By Vivian Houshell
Special to Computerworld

Computers can be a source of fun and creativity as Stan Webber discovered when he became interested in computer art. Webber is a 21-year-old programmer at Armco Steel Corp. in Middletown, Ohio.

"Computers can create drawings that would be impossible for people to create," he says. "Computers can create more perfect art."

Webber has always had an interest in art and because he enjoys working with computers, he found it was fun to combine the two interests.

"Another Being" and "The Proud Peacock" were two of his first attempts at creating computer art. To create them, he used an IBM 1130. The plotter took one hour to draw the final version of "Another Being" and three and one-half hours for "The Proud Peacock."

The drawings were the result of about two months of spare time work. Both have won awards in Calcomp's annual art contest.

"Another Being was the result of experimentation," he says, "and that is the fun part of it."

At Armco the computer and plotter used by Webber normally draw graphs from data, plot the grain structure in steel, and draw statistical control charts.

'The Other Being'

Art Buchwald

Art Buchwald Slated To Speak on 'Systems And Society' at FJCC

HOUSTON – Art Buchwald, political satirist and nationally syndicated columnist will speak at the Fall Joint Computer conference November 17-19 in the Astrohall.

The conference theme will be "Systems and Society" which should give Buchwald an excellent taking off place, commented Robert A. Sibley, general chairman of the conference.

"We're looking forward to his observations concerning our profession's interactions with our society," Sibley said. "At least, I think we're looking forward to them."

Calendar

Aug. 24-28, Amsterdam, Netherlands – IFIP World Conference on Computer Education. Contact: A.A.M. Veenhuis, Secretary-General, IFIP Conference Computer Education 1970, 6, Stadhouderskade, Amsterdam 13, Netherlands.

Aug. 25-28, Los Angeles – Western Electronics Show & Convention (Wescon) sponsored by the IEEE and WEMA. Contact: Wescon, 3600 Wilshire Blvd., Los Angeles, Calif. 90005.

Aug. 31, New York – Fifth Annual ACM Urban Symposium. Contact: Paul R. DeCicco, Polytechnic Institute of Brooklyn, 33 Jay St., N.Y. 11201.

Aug. 31, New York – Second Fortran Forum sponsored by the ACM Special Interest Group on Programming Language (SigPlan). Contact: Frank Engel Jr., Systems Analysis Dept., D-53, Mitre Corp., Box 208, Bedford, Mass. 01730.

Aug. 31-Sept. 4, Munich, Germany – 1970 AICA-IFIP Conference on Hybrid Computation. Contact: Prof. J. Heinhold, Kongressburo ACIA-IFIP 1970, Institut fur Angewandte Mathematik, Arcisstr. 21, D-8 Muchen 2.

Sept. 1-3, New York – Association for Computing Machinery 25th National Conference. Contact: Sam Matsa, ACM '70 General Chairman, IBM Corp., 410 E. 62nd St., New York, N.Y. 10021.

Sept. 17-18, Irvine, Calif. – Computer Science and Statistics Symposium sponsored by the Los Angeles Chapter of the Association for Computing Machinery (ACM), University of Calif. Contact: Dr. Mitchell O. Locks, C-E-I-R Professional Services Div., Control Data Corp., 6060 W. Manchester, Los Angeles, Calif. 90045 or Dr. Michael E. Tarter, Dept. of Mathematics, University of Calif., Irvine, Calif. 92664.

ACM 70 Hopes to Integrate Users, Professionals To Establish a Forum for Defining User Needs

By Harvey Elman
CW Staff Writer

NEW YORK – Providing a structure for bringing users together with computer professionals and establishing a forum for defining and expressing the known and expected user needs of the 70's will be a major goal of the 15th annual conference of the Association for Computing Machinery (ACM) Sept. 1-3 at the New York Hilton.

In keeping with its "unconventional convention" billing, all commercial exhibits have been banned and exhibit space will be devoted entirely to educational exhibits demonstrating aspects of the role of computers in everyday life and in improving the human condition [CW, May 20].

The show will be based around the theme "Computers Meeting the Challenge of Your Future" and promises to be one of the first attempts on the part of the computer industry to make a conscious effort to reach the general public.

In conjunction with the conference, Mayor John V. Lindsay has proclaimed the week of Sept. 1-8 as New York Computer Week.

Societies

Keynote speaker Ralph Nader maintains, "We are becoming a computer society but people want a human being to listen."

ACM's fifth annual Urban Symposium will be held adjacent to the conference Aug. 31, at the New York Hilton. Sponsored by the New York metropolitan chapters of ACM, the symposium brings together interested professionals from the computing field and from the urban problem areas, providing a forum for the exchange of ideas, experiences, and information.

Featured speakers will be C.L. Miller, director of the Urban Systems and Draper Laboratories, MIT, and Dr. Herbert Grosch, senior research fellow at the Center for Computer Science and Technology, National Bureau of Standards.

Registration information for ACM 70 is available from Mrs. Margaret Mahmarian, ACM, 1133 Avenue of the Americas, New York, N.Y. 10036. Urban Symposium information is available from Mrs. Estelle Grinoch, Sperry Rand Corp., Sperry Gyroscope Division, Great Neck, N.Y. 11020.

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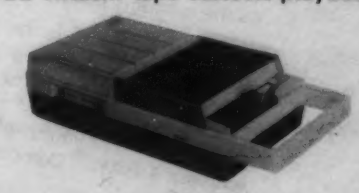

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Programmed Offense?

DP Firm's President Also Calls Pro Football Plays

By Edward J. Bride
CW Staff Writer

CLEVELAND – What does a frustrated programmer do in his leisure time? At least one plays professional football.

What does an aging (mid-30's) professional football player do off-season? At least one is president of a computer services company.

The programmer/athlete is Frank Ryan, who played quarterback seven years for the Cleveland Browns, and who is now backup man in that position for the Washington Redskins.

Last spring, Ryan, who holds a PhD in Mathematics, incorporated a small service organization which he appropriately dubbed Frank Ryan Computer Services. With only four people in his company, Ryan also does some programming, "Although I'd rather not."

A special advisor to Ryan is Redskin Coach Vince Lombardi, formerly of the Green Bay Packers. Lombardi provides "philosophical" assistance in developing the special application packages which Ryan hopes to market.

These include programs for high school and college football teams, although Lombardi's advice is also valued in the "not-necessarily-football directions" of the company, Ryan indicated.

The computer is finding increasing use in sports, especially in football. Several professional teams have already automated their ticket-vending operation, and others have used computers to help map game strategy for early-week workouts.

Nor are sports applications limited to professional teams. The coach of Glassboro (N.J.) State College's football team has programmed an IBM 1130 with the offensive plays of opponents, in order to help his defensive players.

Some of Ryan's packages will undoubtedly accomplish the same end, that of predicting trends of opponents' thinking. Programs will point to "obvious things that suggest recommendations," while "letting the human being make the decisions," Ryan said.

Frank Ryan, backup quarterback for the Redskins, is also president of his DP firm.

Ryan noted that his first area of interest with his new company is the football application, but that he is also hoping to develop an executive-oriented stock brokerage program which he was "not at liberty to discuss in detail."

The Ryan company receives technical assistance in programming, and computer time on a Univac 1108, from a business known as Chi Corp., which is located in the same building.

The affable company president does not foresee a market in any pro football teams except the Redskins. He explains, "It's an unusual quirk about pro football. Owners and coaches are suspicious of collusion as regards strategy during a game. They cooperate in other matters, but cooperation is taboo in this area."

Coach Lombardi is retained on a "personal service contract," with options to buy some of the private stock in the company. This alters the coach-quarterback relationship existing now that the Redskins summer training is under way.

As far as his sports career is concerned, Ryan suspects "this is probably it." He now has a business in Cleveland, and is also ready to pursue his third career, teaching, at Case Western Reserve University.

Double Fees Haunt Tulsa Data Center

CW Midwest Bureau

TULSA, Oklahoma – The "in" thing to do these days is to blame a computer for the mistakes people make, even when the original mistake is being compounded by still more errors.

The computer at the department of public safety for the state was blamed for "doubling" the usual $6 fee for the renewal of an Oklahoma driver's license. Some 8,000 license expirations were sent out with a $12 renewal fee. Naturally, the computer got the blame.

What really happened though, according to Charles Hughes of public safety, was that when the stock requisition went from the computer center to the supply room a "little" notation to have a red stripe printed across the top of the cards, to signify that they were expiration notices for commercial chauffeur licenses, was not included.

The stock clerk sent back plain white cards for regular driver's licenses. About 8,000 residents of eastern Oklahoma received incorrect notices of driver's license expirations, along with a notice calling for a $12 renewal fee.

The mistake was eventually noticed and the processing halted. While the cards mailed to the holders of regular driver's licenses were processed for chauffeur licenses and clearly said so, many of the recipients, "about half," Hughes said, paid the $12 fee without batting an eye.

Now the state has to send them refund checks for the extra $6.

Hughes claims that the error did not cause any problems, just lots of extra paper work.

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Optical Reader Expedites Processing of Groceries

EL MONTE, Calif. – Department managers at the 91 Vons Grocery Co. supermarkets in southern Calif. are receiving faster merchandise deliveries by using a computer system which reads and processes their hand-printed orders.

Like a housewife preparing her weekly shopping list, the Vons managers jot down their orders on special detachable paper forms from a stock order book.

A detachable strip (machine compatible) is coded for page and item number of the stock control book and simply requires the handwritten insertion of quantity desired. The system eliminates the need to code each order prior to computer processing, and also assures the correct item ordered will be delivered.

An IBM 1287 optical reader scans each hand-printed form automatically at a rate of 100 a minute. The information then enters an IBM 360/30 which processes the order and prints out delivery and billing forms.

During a typical day, Vons processes orders for up to 60,000 grocery, produce, liquor, drug and department store merchandise items. The optical reader scans these orders in about one hour.

James Picano uses a special form that an IBM 1287 optical reader will "read" as he hand-prints orders to restock shelves.

Detachable Form for 1287 Optical Reader

Computer Hastens Carpet Cutting

ROME, Ga. – A computer is helping Trend Industries deliver on its promise of "48 or free freight" – picking up the customer's shipping expenses if an order for cut carpeting isn't filled within two days.

Before the computer, cutting floor workers filled orders as they came in, frequently having to handle the same roll of carpeting many times during the day. The order entry system now provides the cutting floor with a daily printout from an IBM 360/30 showing how many cuts are to be made from each roll during the day, so each roll is handled only once per day.

The system accepts orders from several sales divisions for more than 1,000 different combinations of carpet styles, colors and widths.

Each new order becomes part of a data base that is updated daily to reflect the current status of every open order.

The order entry system provides additional benefits in the areas of inventory management.

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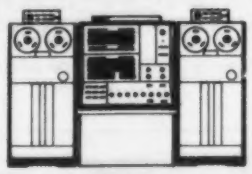

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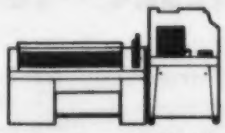

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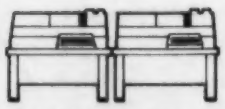

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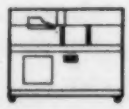

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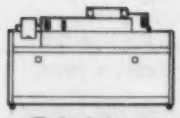

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Computer Cares and Feeds

Steelhead Trout Thrive In Monitored Hatchery

OROFINO, Idaho – Fishermen who wade the cold, clear streams of the Northwest for steelhead trout may soon have a computer to thank for their day's catch.

Army engineers at the Dworshak Dam fish hatchery use an IBM 1800 system to control feeding and monitor water conditons in special ponds where millions of newly hatched fish spend the first months of their lives.

The hatchery, operated by the U.S. Department of the Interior, eventually releases the young trout into the Clearwater River.

The control system was designed by Wismer and Becker, a Sacramento, Calif., engineering firm, specifically for the Dworshak hatchery. It automatically delivers feed to 84 ponds each hour in amounts precise to within a fraction of an ounce.

"The computer is told the number of fish in each pond, the water temperature, the feeding frequency and the required size of food pellet," explained Henry Hoge, engineering manager for Wismer and Becker. "It then calculates, according to a prearranged formula, how much food to deliver to each pond."

"The ponds are kept at an optimum temperature where the fish grow fastest," Hoge said. "If the temperature varies from the optimum, the fish don't eat, and the food supply is diminished accordingly."

The three sizes of food pellets are carried by vibratory conveyors from storage hoppers to a blower-powered delivery system. Streams of air then push the pellets through pipes to the proper ponds.

"There's a natural attrition as the weaker fish die," Hoge said. "In addition, as the fish grow they are separated into several ponds to avoid overcrowding."

The system automatically compiles statistical information that can show hatchery experts how to speed the growth of the young fish.

Hoge said, "As hatchery people learn more from computer reports about how food, frequency of feeding and temperature affect steelhead growths and health, they can make further improvements."

Engineer Builds Hospital System In His Own Home

WEST HARTFORD, Conn. – Perhaps the least likely thing one would expect to see in the dining room of a home in a suburb is a computer. But one rests on the dining room table in the home of James B. Casby, and it will eventually become part of a system that will monitor stroke patients at a veterans' hospital in nearby West Haven.

Casby, a systems engineer at the John B. Peirce Foundation in New Haven, learned that the hospital wanted to install an automatic monitoring system. He gathered all the information needed to make a cost estimate and submitted his idea.

"A few weeks later my proposal was accepted," he said.

For the past nine months, Casby has devoted most of his spare time to the project. He selected a DEC PDP-8/L computer for the heart of his system.

The computer will monitor the well-being of four stroke patients simultaneously. Each minute it will sense the heart rate, respiration rate, blood pressure, and the electrical activity of the brain.

If any of these move outside a preset range, the computer will ring a bell at a nurse's station. The computer will then type out the patient's name and the nature of his difficulty. When requested, a summary of the measurements will be printed out.

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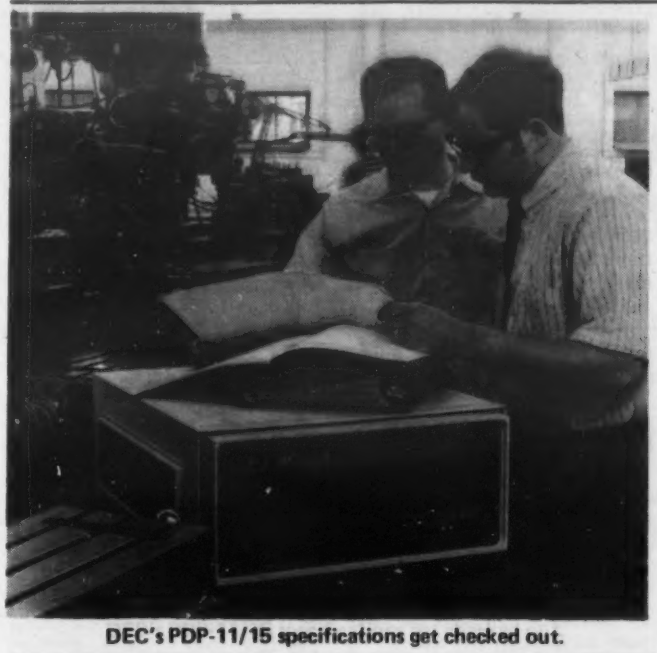
August 5, 1970



DEC's PDP-11/15 specifications get checked out.

Increased OEM Emphasis Shown By Digital With New PDP-11/15

By Frank Piasta
CW Staff Writer

MAYNARD, Mass. – Digital Equipment Corp. (DEC) has launched an under $5,000 member of the PDP-11 computer line in order to upgrade its already strong commitment to the OEM marketplace.

The PDP-11/15, aimed directly at the OEM buyer, is primarily intended for use in dedicated applications, such as numerical control, multistation key-to-tape controllers, and intelligent terminal systems. The processor can also be used as a data concentrator and as a controller for CRTs and plotters, DEC said.

In line with this, the PDP-11/15 is available with two different control panels: The normal programmer's console and a rudimentary panel intended for industrial applications with a minimum complement of lights and switches.

The second of these consoles enables the firm to produce a machine that is cheaper and more secure to cut-down tampering in an industrial environment.

Internally, the Model 15 is completely hardware and software compatible with the PDP-11/20 [CW, Jan. 14]. This indicates the firm's "commitment to a series of machines" in the PDP-11 line, according to Julius Marcus, PDP-11 marketing manager.

Other sources predict that this commitment to the PDP-11 line will include the introduction of a larger member of the series (possibly the 11/25, but definitely not an 11/30) before the end of this year.

'Price Sensitive' Market

The OEM market, according to Marcus, is extremely "price sensitive." New units in the PDP-11 line are aimed at giving the OEM as little (or as much) as he needs for his particular applications – at the lowest possible price.

With more than 150 firms using DEC computers in their systems, the OEM market is "an important factor" in DEC's overall business, Marcus said. Some outside sources indicate that the OEM market accounts for more than 50% of the firm's revenues.

In line with this commitment to the OEM buyer, Marcus said that the PDP-11/15 was "really a complete general-purpose computer, reconfigured to some extent and adapted in software, training, and education for the OEM."

According to Andrew Knowles, PDP-11 product line manager, main core memory is available in sizes from 1K to 32K 16-bit words. Cycle time is 1.2 μsec/word. Diode read-only-memory is available in increments of 32 words to a maximum of 128 words. Access time for the diode memory is 100 nsec.

A novel feature of the diode memory, Knowles said, is that it is user-programmable in the field. A third form of memory, core ROM with a cycle time of 800 nsec, can be ordered.

Total capacity of all memories is limited to 32K words. Read/write memory can be converted to ROM, and vice-versa, in the field, according to Knowles.

Remote Locations

In line with its intended use in remote locations, the PDP-11/15 is capable, Knowles said, of withstanding extremes in environment.

Rated to endure temperatures ranging from 0°C to 50°C (32°F to 122°F), the CPU has actually operated satisfactorily under laboratory testing at temperatures ranging from -20°C to 65°C (-4°F to 149°F), according to Knowles. Humidity as high as 95% can be tolerated.

The Unibus, first announced with the PDP-11/20, is also used in the Model 15. It allows all components in the processor to communicate with any other component. Each physical component can place messages on or take messages off the bus. The central control unit decides which component can next access the Unibus for a message.

The simplified control panel is intended for applications where no programming is to be done at the computer location. It consists of three switches, and two lights, making the unit virtually tamper-proof.

A maintenance pack that fits into an attache case is available for use by the service engineer.

The pack incorporates a paper tape reader and all necessary indicators to test the computer without the use of a control panel or peripheral devices. Knowles said that the simplified panel would be available with other PDP-11s, also.

DEC supplies a full set of 27 hardware diagnostic routines as well as pertinent maintenance manuals with each computer. OEM buyers will be able to purchase any software that suits the hardware configuration.

Installation costs are included in the purchase price. A 30-day warranty on parts and labor applies to all PDP-11/15s. Maintenance contracts will be available. Prices for the contracts have not been decided, but they will, according to Knowles, be approximately the same as for the PDP-8/L, $100/mo.

Under the DEC pricing schedule for OEM users the PDP-11/15 can cost as low as $4,200 and a 4K system will carry a price tag of $4,950 in lots of 100 or more.

The central processor price is $3,200 with programmer's panel and $3,000 without in single quantities. 1K of read/write memory is priced at $2,250; 2K, $2,750; and 4K $3,000. 1K of read-only memory plus 256 of read/write is priced at $2,500, while 1K of ROM combined with 1K of read/write carries a price tag of $3,750.

Under its pricing schedule, DEC offers a 10% discount for quantities of 10, 18% for orders of 50, and 20% in lots of 100. Discounts can be gained through mixed purchases of PDP-8s and PDP-11s.

First deliveries of the PDP-11/15 will be made on April 1, 1971, DEC said. The firm also disclosed that it will begin equipping the PDP-11/20 with a 980 nsec memory on that date.

New Information Source Set By Computerworld/ISD

FORT LEE, N.J. – Marketing experts and computer industry prognosticators will have a new source of information later this year when Computa-Data is launched by International Systems Design Inc. (ISD) here and Computerworld, Inc., publishers of *Computerworld*.

The computer-based Computa-Data service will provide information on software (new and existing), computers and other hardware, systems, marketing practices, contract awards, corporate and financial data, government activities, mergers, new ventures, new technology, new applications, data bases, research, and forecasts, according to ISD.

Textual Abstracts

The service is designed to provide computer-generated reports consisting of textual abstracts on any computer industry subject on request. The information is digested from over 150 publications, world-wide, including every article published in CW.

Initially, the service will be offered in the form of monthly Profiles, or current-awareness reports. Each Profile subscriber will determine, in advance, the exact subject of his Profile, either by selecting the subject from a broad list of topics offered to him or by defining his own specific interests.

Each Profile issue will be individually prepared for each subscriber, by computer, and will include abstracts of all new data about his interests, based on what has been published throughout the world in the past 30 days.

The CW-ISD service is aimed at a wide variety of uses and applications. Among these are: helping executives stay up-to-date on key developments in their areas of special interest; helping computer users select equipment, software packages, and services; alerting industry executives to new developments and trends; aiding management executives in their planning and marketing; and assisting computer industry firms in finding new application areas for their equipment or services.

ISD Supervision

The service will be operated under the supervision of ISD and will be programmed through the patent-pending "ISD Process," which is said to give a retrieval accuracy of over 95% with little or no irrelevant data (noise). All requests for data will be processed within 24 hours

The price for the Profile reports will be $100/yr and will include 12 monthly issues on the subscriber's area of interest.

New CW Section Now a Reality

Welcome to the first edition of *Computerworld*'s new Computer Industry section.

This section will carry news on opening markets, new OEM oriented products and services, and new information sources on the computer industry, as well as notes on special applications, new test equipment, and technology reviews.

The Computer Industry section will incorporate CW's former Business/Industry and Financial sections, and will place increased emphasis on the OEM side of the market.

An addition to the previous user orientation of the publication, it will allow CW to serve the total computer community with timely information while it is still useful.

Honeywell-GE Merger OK Given By French Gov't.

By Michael H. Blake
CW Washington Bureau

PARIS – The French government has removed one of the few possible obstacles to the merger of the computer business of Honeywell Inc. and the business computer operations of General Electric.

In a brief statement issued last Wednesday by the Ministry of Finance in France, the government authorized GE to transfer its majority holding in the Bull-General Electric Group (Europe) to Honeywell.

The French government apparently received assurances from Honeywell that the agreement would not result in the closing of any research centers presently operating in France and that there would be no staff cutbacks. Both possibilities were considered to be major concerns of the French.

French approval is particularly important to the merger agreement because GE's and Bull-GE's strong market position on the continent complements the Honeywell position in the UK.

In addition, Honeywell's strong U.S. sales force is expected to be a substantial factor in selling Bull-GE's line of small computers here.

The major obstacle still remaining in the path of the proposed merger now seems to be the U.S. Justice Department, which often challenges mergers between firms controlling at least 4% of a market.

However, Honeywell and GE sources have indicated that the plans would not have progressed this far if they "did not have reasonable assurances" that the plans would be cleared by the Justice Department.

Even IBM Slows Hiring

'Recession-Proof' Computer Industry Enters Recession

By a CW Staff Writer

BOSTON, Mass. – The valiant warriors against inflation are whistling happily as they march to the unemployment office.

ITEM: NCR has reduced employment by "several hundred" – outside sources estimate 1,000 since the beginning of the year.

The technique has been attrition rather than layoffs, and the reduction has been concentrated in Dayton where the company manufactures peripherals.

NCR officials said that "the data processing sections have not been affected too much by the planned reduction."

ITEM: Control Data has laid off all its domestic computer business employees for 10 days without pay between Aug. 1 and Dec. 31, a move the company said will equal about 10% of the work days during the five month period. The 10% decrease follows extensive layoffs earlier in the year.

ITEM: Recognition Equipment has laid off "about 100 production employees and an as yet undetermined number [of workers] in other departments of the company."

Prior to the "reduction" Recognition Equipment employed over 1,700 people. The firm said the layoffs were caused by a shrinking backlog.

ITEM: Honeywell said this month it plans to consolidate some production operations of its minicomputer division in Massachusetts, which will result in a cutback of 46 employees.

Vulnerability Showing

Once touted as recession-proof, the computer industry has shown that it is just as vulnerable to a depressed economy as any other industry. When major users, such as aerospace firms or auto manufacturers, fall on hard times, orders for multi-million dollar DP machines start drying up.

A number of large systems, previously planned for this year and next, have simply gone into limbo. Even if the economy turns itself around with the next three months, these systems will not be implemented for at least another year over the original dates planned.

Expectations Down

Executives of some of the larger computer firms have pointed out that they expect new business to be off quite a bit the first three quarters of this year, but that it should recover before year-end.

Many of these men are very concerned about personnel right now. It becomes very demoralizing to have to lay people off in quantity, or to offer these "vacations" to long-time employees.

A period of several years is required to build up a quality manufacturing and sales group, and this can all be lost if people lose morale. It may take the companies longer than they think to recover from this economy.

A company like IBM, with its very strong orientation towards the employee, security, and staying non-union, realizes that it cannot afford to lay off people. As things would ordinarily go, new job opportunies would abound within IBM, but indications are that even here, new hiring is being cut back. IBM will, by necessity and intent, avoid any type of labor problems, but it is not clear that other companies will be able to follow suit.

Singer-Systems Sign $5M Three-Year Purchase Pact

BINGHAMTON, N.Y. – The Link Division of the Singer Co. and Systems Engineering Laboratories, Inc., have announced a three-year agreement under which Link will purchase a minimum $5 million worth of Systems computers.

Link plans to use Systems 86/88 computers in a wide variety of applications that may include controlling new systems for training flight crews of jumbo jets, military training systems, and other teaching devices. Link simulators are able to respond to a pilot trainee's maneuvers as actual jets would, through mathematical models programmed into the computers.

Since a jet flies at 10 mile/min, the Systems computer will have to calulate proper flight situations as many as 20 times a second while executing one-million mathematical calculations per second.

These calculations may include up to 1,000 programmed malfunctions that enable the crew to be trained to meet many more situations than they might face in a lifetime of flying. Besides these safety factors, the simulation systems sharply reduce the time and costs of in-flight instruction for such advanced jets as the B747, DC-10, and L-1011.

The Systems 86/88 family has a cycle speed of 600 nsec and an I/O transfer rate of 1.66 million 32-bit word/sec. Systems 88, the computer family's multiprocessor version, uses from one to four CPUs.

Under terms of the agreement, Singer Division may purchase any of Systems' line of real-time computers. However, a company spokesman said that the agreement primarily covers Systems 86/88.

Terminals Missing

Com-Share Hits 'Over Enthusiam'

CW Midwest Bureau

ANN ARBOR, Mich. – A good salesman is known to consider routine paperword as the bane of his existence. Filling out reports is not his cup of tea. Not having them filled out, or filled out inaccurately, can put him and his company into dire straits.

If anyone can add credence to that statement, it would be Com-Share, Inc., a large time-sharing concern based in this college city.

"The only terminals we own right now," said Jim Reed of Com-Share, "are the ones we can't locate."

'Over Enthusiasm'

Reed said the situation was brought about by what he termed "the over enthusiasm" of a field sales force in selling new time-sharing accounts. A standard, and legimate practice of "loaning" a terminal to a prospect got out of hand.

"We had some men installing terminals in people's homes," he said. "They were literally giving them away."

At that time, Com-Share, Inc. owned the terminals, approximately 500 ASR 33s from Teletype. While the "loaning" of terminals sold accounts for the company, it also brought about the problems.

Prospects tried the time-sharing, and, for one reason or another, didn't take on the service. Others did take the service, and later canceled. Some even canceled and moved, or went out of business and closed their doors. Meantime, terminals were going into and out of prospects' places of business without even a semblance of record keeping.

Missing Terminals

Com-Share's field sales force, like any aggressive field sales organization, had its share of individuals who finished training and started selling and then, either of their own volition or at the company's suggestion, left. With them went the knowledge of the locations of some of the terminals they had used in prospecting.

In other instances, salesmen actually forgot some installations. "I'm sure," said Reed, "that some people who took the 'loaners' for a trial period are still waiting for us to come pick them up. Only we don't know where they are."

This situation of no records, when multiplied by a number of men in a given branch and then multiplied again in various metro-markets, can total up very quickly to a sizeable dollar volume of lost or misplaced equipment. In Com-Share's case it totaled nearly $200,000.

Reed says that Com-Share has tightened up their operation. A very strict inventory control is the practice now. While Com-Share will still allow a prospect or a new customer the courtesy of a "Loaner," the branch sales offices are restricted to one "demonstrator" terminal at a time.

The terminals in question, of which Reed said there are about 30 or 40 ASR 33s still missing, had adhesive stickers on both the front and the rear of the machines identifying them as the property of Com-Share.

The one permanent identity mark is the manufacturer's serial number, he explained, which is located under the glass cover of the machine on a vertical (as one looks into the machine) base plate in front of the typing mechanism.

Since no records were kept on the machines as loaners, which machines are actually missing cannot be accurately stated by Com-Share. "The missing terminals," Reed said, "would have a serial number between 110,000 and 165,100."

Racetrack Wescon Site For Computer Emphasis

CW West Coast Bureau

LOS ANGELES – Wescon, billed as the largest electronics conference and exhibit to be held in the western U.S. will take place Aug. 25-28 here with an increased emphasis on computer technology and use.

This year there will be 85 booths in a special computer exhibit compared to last year's 40, in addition to exhibits concerned with computers and instrumentation or computers and manufacturing.

The technical section will have special sessions on computer industry topics. Part of the increase is due to a change in the by-laws of the Western Electronic Equipment Manufacturers' Association (Wema) to include software houses for membership as part of the western electronics industry. Wema is co-sponsor of Wescon, along with IEEE.

Computer Sessions

Some of the special computer sessions and chairmen are: managing the development of large software systems, Marvin Luther, TRW; evaluation of proprietary software, John Postley, Informatics Inc.; and minicomputers in process industries, Stuart P. Jackson, Jackson Assoc.

Others are: hands-on programmable calculators, Robert Koeper, *EDN Magazine*; evaluation of time-sharing services, V. Muglia, Hoffman Electronics; the impact of interactive computing systems on engineering problem solving, Juris Reinfelds, University of Georgia; computer-aided design capability of digital logic blocks, Richard M. Jennings, Telpar, Inc. Several papers in the general program also apply to aspects of computer use or design.

A special feature of this year's meeting is a two-day symposium on applying technology to public problems. Speakers will discuss the problems, assess the capabilities, discuss the economics, and forecast some of the systems of tomorrow. Registration for the symposium is $50, and includes one luncheon.

The British Are Coming

Among the exhibitors are a record number of 28 British companies whose equipment will include a computer, computer interface units, component analysis and test equipment, and a wide range of instruments and components.

An information booth will be staffed by representatives of the Electronic Engineering Association and the Electronic Components Board. In addition, Britain will contribute five papers to the technical meeting on the subject of British advances in telecommunications.

Recent cancellations to the computer exhibit include XDS, but Digital Equipment Corp. is in with twice as many booths as last year. The overall exhibit space is down slightly from last year's 1,170 booths to 1,050.

Attendance Down

Attendance is expected to be 40,000, down 10% from last year's 46,000. As 80% of Wescon attendees come from the Los Angeles and San Francisco areas, Wescon does not expect attendance to be affected by company cuts in travel expenses.

As a sign of the times, unemployed engineers will have the $3 registration fee waived for them so that they will be encouraged to come.

For information on Wescon, write to Western Electronic Show and Convention, 3600 Wilshire Blvd., Los Angeles, Calif. 90005 or phone (213) 381-2871.

Astroflash Sets Expansion Thanx To Lucky Stars

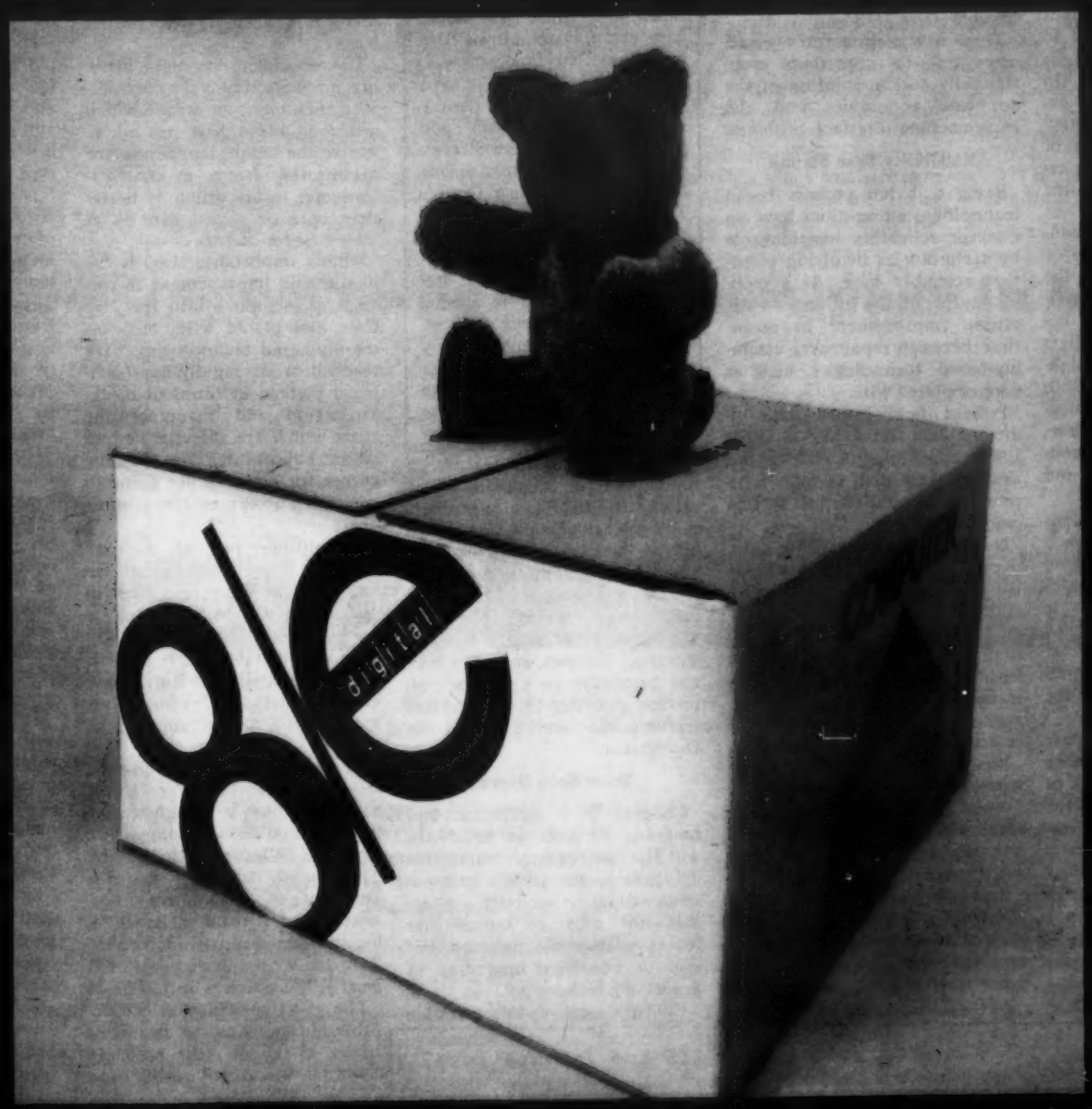
NEW YORK – Business Down? Layoffs looming? Maybe your horoscope is bad.

At least one firm seems to be doing well during the national economic slowdown – and it claims its success is due to astrology.

Astroflash, a computerized horoscope dispensing operation with its first installation in Grand Central Station, has announced plans for a nationwide franchising network, as well as the establishment of operations in Australia, Singapore, and Europe.

Astrological Research Corp. (ARC), which has the American and subsidiary rights to Astroflash, operates an IBM 360/25 here and presently fills mail orders from its operations in Australia and Singapore. The Astroflash service originated with Ordinastral, a French firm that operates a center in Paris.

The new PDP-8/e:
Its own mother wouldn't know it.



The PDP-8/e is a radical departure in computer design. There's no back panel wiring – everything plugs into the OMNIBUS,™ even the CPU. In any order. It's completely flexible: you buy only what you need. And if you need more later, just buy it and plug it in. And the PDP-8/e is easier to interface and easier to maintain than old-style computers.

We've made a few other changes. Easier programming. 1.2 μ sec memory cycle time. 15 added instructions. 256 words of read-only memory. 256 words of read/write memory.

Yet there's no generation gap between the PDP-8/e and the rest of the PDP-8 family computers in 7500 world-wide installations. They all use the same peripherals (over 60 of them). They're all program and interface compatible, they all have extensive applications and documentation. PDP-8/e was born with a silver software package in its mouth.

The basic 4K machine sells for less than $5000. With teletype, less than $6500. Quantity discounts available.

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The Great Memory Debate - Part I

Semis Set Sights on Core Cornered Memory Market

By William J. Taren
and Howard Geller
Special to Computerworld

If semiconductor memory was once viewed as an exotic future technology, it can be no longer. Today it is approaching a technology of maturity.

This maturity has effected a switch in emphasis from the basic research and development typically associated with LSI to that of building high throughput manufacturing capabilities. In turn, this has allowed the designer of "memory components" to emphasize the problems of use and concentrate efforts on his definition of monolithic "memory systems."

At a recent industry conference, Dr. David A. Hodges of Bell Telephone Labs stated the case for monolithics: "Semiconductor memories will become dominant in all fast (less than one μsec) random high-access applications by 1980. They will be superior to magnetic memories in cycle time, cost, physical size, power consumption, maintainability and availability."

All of this, of course, means better system performance. Each of the parameters mentioned are important system design features which have direct user payoff. It is important, then, to treat each of them in detail as we look at each of the technologies competing in the memory market of the 70s.

It serves some useful purpose to view a computer as a memory system connected to a series of processors. Consider for example, that an arithmetic processor is a unit that manipulates data in memory, while logic units use this information to control system behavior.

In a model of this type, it is apparent that the performance characteristics of the memory system have a significant effect on systems performance.

Being a homogeneous technology, monolithics offer the potential of entirely new system architectures that will involve parallelism. Implementation of memory hierarchy will provide transparency for all levels of programming. Associative memories will become economically feasible.

These new architectures can be expected to contribute substantially to the solution of the software economics and the man/machine interface problem.

Reliability Seen Strong

Being a batch process based technology, monolithics have an intrinsic reliability unachievable by technologies involving piece-part assembly base. As a technology it permits orders of magnitude improvement in mean-time between repair over assembly-based technologies such as core or plated wire.

Present field return data indicates that reliability of MSI-LSI technologies is five to ten times greater than possible with previous generations of system components.

Using presently available data, a projection of mean-time between repairs for a megabit semiconductor memory can be projected to greater than 10,000 hours – a number which is at least five times better than core memory of the same capacity, even excluding performance considerations.

Predictions and data for plated wire reliability still remain to be proven; however, it is our contention that this technology will not be of sufficient improvement over core.

This improvement in reliability becomes a necessity when one views the increasing costs associated with field service, spare parts storing, field training, and, of course, customer satisfaction.

This is the first in a series of four articles dealing with the "great memory technology debate" now taking place in the computer industry.

While this first item defends and outlines the future for semiconductor memory systems, the following two articles will focus on plated wire and the ubiquitous core memories. The final article in the series will examine the reactions of the men designing computer systems and using the three technologies.

The authors of this article are both with Cogar Corp.'s Technology Division in Wappingers Falls, N.Y. Geller serves as director of product development and was previously with IBM in special circuits and systems development. Taren, formerly manager of memory module production at IBM, is now Cogar's manager of marketing systems and sales.

A very significant feature of semiconductor memories which attacks the field service problem is its logical organization which allows bit-organized packaging. This allows maximum repeatibility of a minimum number of card types. Still other advantages are simple diagnostic trouble-shooting routines, and of course, the capability to use error correction circuitry to even further increase the overall MTBR for the system.

Price Seen Down

Coupled to a significant and on-going increase in reliability will be an equally impressive decrease in the OEM's cost for semiconductor memory – a result not only of competitive forces within the industry but also of continual upgrading of processing technology.

Continuation of this trend in MSI-LSI circuitry will dictate a selling price in the early 70s of 5 cent/bit to 30 cent/bit, depending on performance, for completely packaged semiconductor memories. Though this range is significant, it is also misleading, because the actual cost value of semiconductor memory cannot be compared with other technologies on a simple price per bit basis.

The dominant factor in memory pricing today is the cost/performance ratio, an area in which semiconductors have no equal. Across the board, semiconductor memories have a cost/performance ratio which is better than core or plated wire by at least a factor of two.

What's important, also, is the predictable improvement in this ratio as we move into the 70s. Core and plated wire, both assembly-based technologies, have reached or are rapidly approaching a plateau in terms of mechanization and manufacturing costs which are directly tied to labor. Labor rates and learning curves for each are not going to get much lower in the coming years.

Monolithics present a sharp contrast. They have the potential for significant increases in density, yield, and packaging innovations – all of which will have a predictable effect on pricing and reliability. A quick look at the past four years gives ample evidence in support of this.

At the beginning, in 1966, the level of integration was 16 bit/chip. At today's manufacturing level of bipolar technologies, we can put 128 bits on a single chip. This already surpasses the cost performance and density possible with ferrite cores. By 1971, density per chip will increase to 256, and we will have levels of at least 1,000 bit/chip by 1975.

The first production monolithic buffer memories had cycle times of about 120 nsec. In 1968, it was down to 80 nsec, and by 1975, it will be less than 10 nsec.

In 1968, the FET/MOS memories entered their first manufacturing phase, and it has taken until 1970 to see any significant deliveries of 256-bit chips. But in 1971 we'll see 1,024-bit chips and by the mid 70s, 4,096-bit chips will be reasonably commonplace.

The performance of these MOS memories started in the area of 1 μsec cycle, but by 1971, with the help of N channel devices, 200 nsec to 300 nsec cycle time products will be in use in commercial processors. By 1975, MOS performance will approach 100 nsec.

Unparalleled Growth To Come

It is evident now, and has been for years, that the levels of integration, reliability and quantity for memories will vastly increase as industry meets the demands for higher and higher performance mainframe and peripheral units.

For the past 15 years, memory capacity per system has been doubling every 2 or 2-1/2 years. As a result, total memory bit requirements have been increasing more rapidly than the increased use of computing equipment.

In 1966, total memory bit production was 9 billion. By 1968, this had jumped to 13 billion. Next year, bit requirements will be 18 billion to 25 billion, and by 1975, this will have increased to 40 billion to 60 billion bits.

The share of this market for monolithic semiconductors was less than 1% in 1968. But by the end of next year, monolithics will constitute 30% of new memory sales. By 1975 the penetration will double to 60%.

The 70s will see monolithic semiconductor memories completely take over the market for memory of 100,000 Mbits or less for reasons of cost alone. They will also make major penetration in performance-oriented systems, those with cycle times of 1/2 μsec or less, since no other technology is competitive in terms of cost for performance.

It is only in the area of multiple megabit applications or cycle times of 3/4 μsec or slower that the other technologies, core or plated wire, can begin to compete in the 70s, excepting, of course, those special applications where volatility or radiation hardness require magnetic storage.

Heavy Investment Seen

To fill this demand, the 70s will see a heavy investment in capital equipment and people devoted to semiconductor memory production. Already, a few major firms and a limited number of smaller ones have entered the delivery arena.

In each case they are demonstrating the ability to develop memories in significant quantity to convince the major computer manufacturers that monolithics are available today.

Tooling and automation will continue to be worked on and improved, demonstrating the ability of this industry to scale-up to meet the demands for memory, while maintaining the superior characteristics of the product.

For the computer manufacturer today, then, the looming question is not which technology, but when. He is faced with a major challenge and opportunity in understanding and applying LSI.

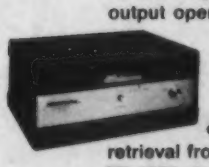
If he delays he faces a very real dilemma. For much of his competition – already armed with an understanding of LSI for memory – may effectively use monolithics to skip ahead in making dramatically improved equipment.

Big D

DALLAS – Computers and Texas names continue to foul up everything. A girl translator in the Varel Manufacturing Co.'s foreign division came into Sales Manager Bill Porter's office the other day and asked; "Is there really such a town as Dumb Ass, Texas?"

They checked it out and found the reference, of course, was the town of Dumas.

**Which would you rather have?
Fast drop in loading . . . or 15 minutes of agony?**



Economics requires efficiency at low cost. Take a look at a Tennecomp TP-1351 magnetic tape unit and matching interface in action. It's designed to eliminate almost all paper tape input/output operations. While increasing the speed of program assembly, loading, data storage and retrieval from 10 to 20 times. TP-1351 stores up to 256,000 words on a 4-track continuous-loop cartridge that also eliminates handling problems common to paper tape. That's efficiency. For the low price of a TP-1351 you can't afford not to use magnetic tape with your mini-computer. All for under $2,000. That's economics. Write or call for complete information on the Tennecomp TP-1351 Magnetic Tape Unit and other peripheral computer products.

TENNECOMP SYSTEMS INC.
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IS the international marketplace the key to success in the computer industry at a time when things aren't going so well here at home?

The current Gray Sheet probes this concept as it examines the world of the computer outside the U.S. Send for the current issue -- $8. Or, go ahead. A year's supply only costs $75.

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Applicon's Alice Allows System Designers to Leave Work Early

BURLINGTON, Mass. – Every Teletype keyboard becomes a breadboard for systems designers with Alice, a digital logic network simulator program from Applicon Inc. The company said Alice can simulate circuits implemented in any form, from completely asynchronous designs to synchronous two- and four-phase MOS designs.

According to Applicon, Alice can be used either to verify the behavior of a logic network or to analyze detailed network timing problems. Network input is said to be simplified by the program's catalogs of standard logic families.

In addition, AND, OR, NAND, NOR, flipflops and function gates are available. Other features of Alice include independent rise and fall delays for each element, synchronous logic elements, user defined logic building blocks, and a complete network editing capability.

Alice is described by Applicon as a three-valued, full lookahead simulator. Complete spike and hazard detection is available, the company added.

A flexible set of simulation control commands allow the user to specify inputs and internal logic values at any time as well as apply both nonperiodic and periodic input sequences.

Complete control over output printing allows the user to observe only those events of interest, Applicon said.

Interactive Program

Alice is an interactive program designed for remote access and remote batch use from a Teletype or similar terminal. Written in Fortran, the package can be implemented on a variety of systems. Alice has utilized a DEC PDP-10 and requires at least 16K storage.

Available on a time-sharing network, Alice can also be purchased for in-house installation on the user's own equipment. Price of the package is approximately $20,000, depending on specific user requirements.

Arrangements for use of Alice on the time-share network can be made through Applicon at 83 Second Ave.

Test Equipment Notes

Telpar Has TestAid Unit

DALLAS, Texas – TestAid, a logic test design and documentation system for assembled printed circuit boards or semiconductor arrays – bipolar or MOS, LSI, or MSI – is available from Telpar, Inc.

Input to the system is a package level logic schematic diagram, a list of all IC types used, the type of tester and tester input format to be used.

The TestAid package provides a Test Sequence Analysis Report, report of logic diagram input data, input pattern pin sequence, output pattern pin sequence, list of possible defects, and the test sequence, listing input patterns with the resulting output patterns that will be generated from a properly functioning circuit.

The program will also provide two types of tester tapes. If the user's test hardware is a standard tester, a Standard Tester Tape, ready for loading is used. If the user's tester is not standard, a customized tape containing all test pattern and defect information in computer-readable form is included.

Telpar is at 4300 Sigma Road.

Test Probes Out at Data

WILLOW GROVE, Pa. – Eight models have been added to the Data Display Systems, Inc. line of small general testing probes designed specifically for use on ICs.

The "Mini-Grip" family of probes is matched to the particular logic family to be tested; thus, the measuring instrument, with the probe as an interface, responds to signals in the same manner as the logic elements of the observed system, the firm said.

With unit price ranges running from $9.50 to $11.50, the new units offer banana or tip plugs or jacks as options.

Data Display Systems is at 139 Terwood Road.

Tymshare Planning Logsim and Logmin To Aid Designers

PALO ALTO, Calif. – Tymshare, Inc. is offering two special application services, Logsim and Logmin, which automate two tasks of the electrical engineer engaged in circuit design.

Logic Simulation (Logsim) allows engineers to simulate a digital logic circuit and to check for logical errors and timing problems in a proposed design, according to the company.

The program is designed to generate timing diagrams, trace logical changes of each block, make major or minor modifications in the circuit configuration, and evaluate the effects of propagation delays.

Logic Minimization (Logmin) is a program that will provide a circuit design engineer with the Boolean equation to produce a specified truth table for the most efficient logic circuit in a particular design.

The two programs are available in conjunction with Tymshare's time-sharing service at no extra premium charge. The normal charge is $13 to $16 for connect time plus a CPU charge of 4 cent/sec.

The company is at 525 University Ave.

Standard Memories With 4K Capacity Debut at Corning

RALEIGH, N.C. – Corning Glass Works now has available standard 4,096-bit, 16 MHz glass memory modules on an "off-the-shelf" basis.

The units, which come preassembled, pretested and ready to plug in and use, have glass delay lines as the recording medium and feature a delay time of 256 μsec. The 5.9 in. by 4.5 in. by 1 in. modules require no power supply, according to the firm, because they have high speed transistor-transistor logic (TTL) flip-flop input/output interfaces.

The standard modules, which operate in temperatures ranging from 15°C to 55°C with power dissipation of approximately 1.7 W, will be priced at 2.5 cent/bit in quantities of 1,000 or more.

Corning Glass Works is at 3900 Electronics Drive.

we've opened a new page in our life.

COMPUTER INDUSTRY

Our new section, "Computer Industry," makes us the first publication to carry all the news of interest to personnel engaged in the design, production application analysis, programming and use of computer systems, and in the industry that supports these activities.

Computerworld now truly serves the *full* computer community.

We will continue to cover all the news of interest to users of data processing equipment. Our coverage in this area has already made us the fastest growing and most widely read user publication – all in just three short years.

The industry is growing. And with it a need for a new media concept.

The computer industry is now the fastest growing in America, and even sharper growth curves are being charted in Europe and Asia. It's rapidly becoming the largest single industry in the nation and should surpass even the automobile industry in the 1980s. In the U.S. alone, more than 250,000 people use 50,000 computers and data processing equipment for almost every conceivable type of job.

And more advances are on the way.

At this time, the computer industry finds itself in a paradox. It is at once the mainstay of the burgeoning information explosion and at the same time starved for information – information of all types on marketing, manufacturing, design and specialized applications.

The information is there, but to date, no effective medium has been developed to disseminate the data quickly, concisely, and accurately. Key developments in subsystems often go unnoticed, until too late. Market opportunities are missed, because they are not known. And, possibly worst of all, duplication abounds needlessly, resulting in wasted research and money.

Our "Computer Industry" section will fill that need.

This section will carry all of the news about subsystems used in computer and peripheral gear, in addition to all of the information about complete systems (such as terminals, memories, displays, etc.) offered on the OEM marketplace.

Computer Industry will keep systems designers alert to product advances. It will spotlight OEM for executives (new business opportunies) and provide in-depth analyses of of present markets. There will also be information on competitive products and where they are being sold, as well as all of the information on the huge government market – federal, state and local.

We will also feature in-depth interviews with personnel involved in exploring new technologies or responsible for widening market horizons.

All of this information will be packaged concisely, and presented in a timely fashion. All the news available in time to use it.

For the first time, there will now be a publication that truly serves the entire range of people involved with computers and their uses – the, full computer community.

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COMPUTERWORLD

Dual Head Drive From Marshall Betters IBM 2311 Performance

SAN MARINO, Calif. – A dual-head drive from Marshall Data Systems that is format and logic compatible with IBM 2311 disk drives boasts faster start-up, access and stop times than the IBM units.

Intended for the OEM market, the M2500 Discdrive is said to approach 24 msec average access time, with a maximum time of 58 msec, more than twice as fast as those of IBM's drives.

The M2500 uses a binary hydraulic actuator which, according to Marshall, eliminates the need for electronic components, mechanical gears, wheels, racks and pinions.

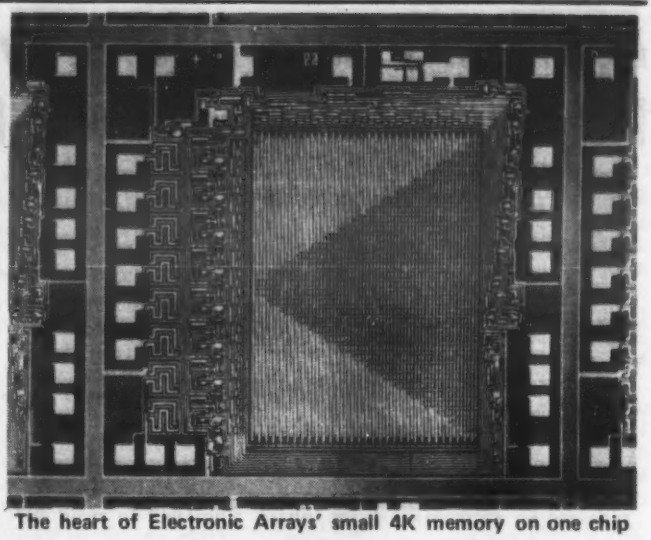
The lower mass of the dual ceramic recording heads is said to enable them to fly over irregular disk surfaces and the heads are guaranteed against damage by such surfaces.

Two read/write heads are used per disk surface. Each head is used to access 100 tracks, which Marshall said is half the number accessed by a standard head.

The M2500 is plug and program compatible with the IBM 2841 controller and the IBM 2311 disk drive. Marshall guarantees the M2500 to read a disk pack written by a 2311 or write a disk pack to be read by the IBM drive.

Prices for the M2500 start at $13,000 in unit quantities and Marshall said OEM discounts are available. The drives are currently available on a three-week delivery schedule.

The Marshall Systems Division of Marshall Industries is at 2065 Huntington Drive.



The heart of Electronic Arrays' small 4K memory on one chip

Small Read Only Memory By Electronic Arrays Set

MOUNTAIN VIEW, Calif. – With a chip area of 88 mils by 94 mils, the EA 3300 is claimed to be the smallest 4K-bit ROM currently available.

Produced by Electronic Arrays, Inc., the MOS device is organized as 512 words, 8 bit/word. Two output inhibit controls allow operation as a 1,024 word, 4-bit/word, array. The output inhibit control also allows the use of multiple EA 3300s in a wire-OR'd configuration.

The EA 3300 requires two non-overlapping external clock lines, but the outputs appear as steady-state signals as long as the address remains unchanged.

The only DC supply required is the output buffer supply, which is variable and can be biased to drive bipolar output loads directly, the firm said.

Within the area of the chip, 4,692 transistors are used to accomplish the memory and address decoding functions. Programming of the memory matrix is accomplished through the use of one custom mask pattern during the fabrication of the device. MOS mode P channel technology is used in the manufacture of this product.

The device is packaged in a 24-lead metal ceramic hermetic dual-in-line package which measures 1.2 in. by 0.6 in. The gold-plated kovar leads are intended for insertion in hole rows on 0.6 in. centers.

Other features include: low power consumption (typically 100 Mw), 1.2 μsec typical access time over the full temperature range, bipolar output drive capability, and input gate protection.

EA has available from distributor and factory stock the EA 3307 which is an EA 3300 already programmed to accomplish in one package the conversion of 7-bit Ascii to 8-bit Ebdic and 8-bit Ebcdic to 7-bit Ascii.

The EA 3300 is built to order in eight to 10 weeks.

Prices of both the 3300 and 3307 are approximately 1.5 cent/bit ($60 each) in prototype quantities of 25 and about 1 cent or less per bit in production quantities.

Electronic Arrays, Inc. is at 501 Ellis St.

Fairchild Semi's Logic Unit Features Lookahead

MOUNTAIN VIEW, Calif. – Fairchild Semiconductor has announced a high-speed, 4-bit arithmetic logic unit that can be expanded into a low-cost 16-bit unit.

The 9340 features an internal "carry lookahead" network.

It is a TTL/MSI circuit that can perform two arithmetic operations (add or subtract) and any of six logic operations based on combinations of A and B inputs.

The multifunctional device accepts two 4-bit binary words in parallel, performing addition in 28 nsec and subtraction in 33 nsec.

The 9340 is designed to accept carry lookahead outputs from three other 9340 packages, producing a 16-bit arithmetic logic unit (ALU) without additional gates. As a result, Fairchild said, add time for two 16-bit words is 42 nsec. Longer word length ALUs can be constructed from multiple 9340 packages. Each 12-bit increase in word length results in an additional 14 nsec add time.

The arithmetic performed by the 9340 is on binary numbers in 1s complement, 2s complement or sign-magnitude notation. Input words can be either active high or active low.

Fairchild's new product has input/output characteristics that provide easy interface with DTL, LPDTL and other TTL devices from the MSI family, the firm said.

The 9340 is available in 24-lead dual-in-line packages and ceramic flatbacks at both the military and commercial temperature ranges with prices as low as $14 in the 100-999 unit range.

Fairchild Semiconductor is at 313 Fairchild Drive.

Some Abbreviations Found In Computer Industry Outlined

As a service to some of our readers that may not be immediately familiar with many of the technical abbreviations found in this section, CW will from time-to-time list some of the more popular of these terms.

The following should be a helpful start:

- MSI – Medium Scale Integration
- LSI – Large Scale Integration
- MOS – Metallic Oxide Semiconductor
- DTL – Diode to Transistor Logic
- TTL – Transistor to Transistor Logic
- OEM – Original Equipment Manufacturers
- Hz – Hertz
- W – Watts
- V – Volts
- Ω – Ohms
- M – Mega

EUROPE TODAY

Issue I2. France had over 5,000 computers installed at the end of I969. More than 50% of these were small card-based systems. Bull-GE holds 25% of the total French market. These two points - plus others - are studied in Issue I2 of EDP Europa Report which concentrates on the French scene and the Honeywell- GE merger.

Order your copy of EDP Europa Report Issue I2 now, at the non-subscriber price of $5 (£I. I5s) USA, $3.35 (£I. 8s) Europe and have its full value accredited to an annual subscription for 24 issues $65 (£27) if taken up within two months. Orders may be placed at either of the following offices.

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Pioneer Acquisition Set Allows Spike Analysis

SANTA MONICA, Calif. – An acquisition system that will allow a computer to perform full-time, unattended monitoring and simultaneous analysis of transients, surges, spikes and other random phenomena occurring on electrical equipment is available from Pioneer Magnetics, Inc.

These phenomena, resulting from such causes as lightning strikes on aircraft, interaction between electronics subsystems, and aperiodic power system malfunctions, can be acquired from many test points by the PM 1750/1760.

Out-of-tolerance parameters are detected, measured and analyzed. Positive and negative transients of less than 100 nsec can be detected and analyzed in real time, the company said.

The new system is designed to replace such instruments as high speed oscilloscopes, high density tape recorders, and noise and field intensity meters.

Input characteristics feature 10 MΩ impedance through a Tektronix input probe and 1 MΩ without the probe.

Wide-Band Capability

The input amplifier has wide-band capability from DC to 3.5 MHz, with common mode and isolation specifications said to be satisfactory. Standard full scale amplitude ranges cover 1V to 1,000V, and full scale rise time ranges are from 1 μsec to 1 msec. Precise time of occurence of each transient or out-of-tolerance condition may be recorded, the company said.

Overall accuracy of the system remains within ±5% of full scale values, the company said; however, Pioneer added, with employment of a modular PM 2234 calibrator system, pretest calibration removes essentially all error.

Pioneer Magnetics, Inc. is at 1745 Berkeley St.

Mini Makers Given Head Start With New Compiler from EG&H

LEXINGTON, Mass. – Minicomputer manufacturers can get a head start on software support with an intermediate language (IL) compiler from Evans Griffiths and Hart (EG&H).

With paged machine features, the compiler can be provided either in the form of a Fortran program to run on large machines, or in the minicomputer's own language, according to EG&H.

Usually a two-pass compiler when used on the mini, IL is said to allow user programming at a level of detail between Assembly Language and the conventional higher level languages. It is designed to combine the flexibility and control of code produced inherent in assemblers with the readability and easier debugging of the conventional compilers, EG&H said.

IL is machine-dependent, so that the user has full use of all the features of his particular mini.

The IL coding can be very compact, the developers claimed, allowing the user to include, for example, a number of operators within a single statement, such as A-B+C-D&E.

Macro-Assembler

In addition to the basic compiler package, a macro-assembler can be provided. This extension may include IF and REPEAT statements to control code generation, symbol table capabilities, syntax utilizing the full Ascii set of characters, and the redefinition of macros by the user.

For paged machines, IL includes an allocation feature allowing IL programs to be written in segments of any length less than a page. The allocator assigns these segments into the available core space.

The developer said that an "average implementation" would probably take three months at a cost that varies from machine to machine, depending upon the complexity of the implementation for the particular mini, and the capabilities included in the macro-assembler, if any. The cost, however, is "in the neighborhood of $20,000" according to an EG&H spokesman.

Evans Griffiths and Hart is at 1884 Massachusetts Ave.

ICC Memory System Offers Fast Cycle Time for Terminals

EL SEGUNDO, Calif. – A recently announced core memory system for minicomputers and terminals from Information Control Corp. (ICC) features 900 nsec full cycle time.

Called the Comrac 90, the memory is said to complete read/restore and clear/write full cycle operations in 900 nsec. Buffer read and buffer write modes require 600 nsec, while the read/modify/write mode is a split cycle requiring a minimum of 1.05 μsec to complete.

The basic memory (up to 8K by 9, or 4K by 18) is composed of a drive board, a data board and a core array. Overall dimensions are 11 in. by 12 in. by 2 in. Self-contained except for DC power, the module can be mounted using either standard card guides or the eight standoffs provided.

The memory is field-expandable to 32K words by adding identical modules. Temperature compensation is standard and allows operation from 0°C to +50°C. Need for a thermistor on the power supply is eliminated, ICC said.

Options include drive voltage of +30 V and ±5 V, a buffer cycle for read/write operations at one half cycle time, a read/modify write cycle, and data guard/reset to prevent loss of data during power on and off sequences.

The OEM price for a 4K by 18 stack at a 100 firm buy level is $1,800.

Information Control Corp. is at 9610 Bellanca Ave.

6,000 Word/Minute Thermal Printer Featured By NCR

DAYTON, Ohio – NCR has available a commercial version of its thermal printer reportedly based on the same technology NCR developed for Project Gemini printers. The nonimpact thermal printing device uses a 5 x 7 dot matrix and prints up to 30 char/sec on 8-3/4 in. heat-sensitive paper using an 80-column print line.

The military printers have in some cases provided speeds of up to 6,000 word/min, and certain models have operated with a mean-time between failures of more than 40,000 hours, the equivalent of 10 years of normal operation, the company said.

The commercial NCR thermal printer measures 11-1/2 in. by 7 in. by 5 in. and weighs 10 lb.

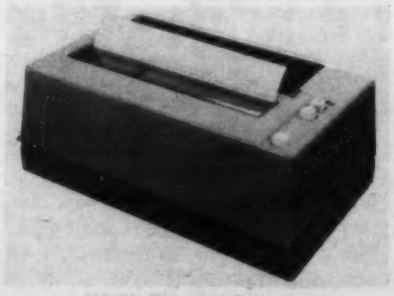
Applications include operation as a fixed or portable terminal, as a mobile communications device, and for providing hard-copy records from CRT displays.

A spokesman said that the printer is "virtually maintenance-free." The miniprinter operates with a durable heat-sensitive paper, according to NCR, and the device is said to be noiseless.

Code format is Ascii serial or parallel input, with other codes available.

The thermal printer with parallel input is priced from $1,650 (one unit) to $1,100 (1,000 units). With serial input the price ranges from $1,750 to $1,160. Delivery is 10 to 15 days. Evaluation units are available immediately.

National Cash Register Co., Industrial Products Division, is at 3131 Dixie Highway, Cox Plaza.



NCR's Thermal Printer

Computer Access Cuts Cassette Drive Costs

PHOENIX – An improved version of its Model 350 cassette tape transport, the 350A C-Drive, from Computer Access Systems carries a unit price 10% lower than the older model.

The modifications – a simplified servo system, more convenient power requirements, and fewer components – are credited by the company with making the price cut possible.

At 1,600 flux change/in. over a tape speed of 4 in./sec to 20 in./sec, the 350A is said to be suitable for both incremental and continuous operation.

With a capacity of 300 ft of computer-grade tape, designers can achieve a packing density in excess of five-Mbit per cassette

The unit is housed in a 5-1/2 in. by 5-3/4 in. by 3 in. package and weighs 2.5 lb. Evaluation units, priced at $720, are being filled in less than ten days, the company said.

Computer Access Systems, Inc. is at 3050 W. Clarendon Ave.

New OEM Products

Sealectro Announces Reader

MAMARONECK, N.Y. – A card reader using bifurcated, rhodium-plated contacts and featuring a typical contact resistance of 40 MΩ after 1 by 10^6 operations is available from Sealectro Corp.

The 12 by 80 reader is capable of reading cards soiled by dirt accumulated in everyday handling, the firm said, and reads all 960 points simultaneously. The units will switch 100 V and carry up to 3 A under static conditions.

The unit is designed for use with standard hole size and spacing format and includes a complete mechanical lockout, the company said.

Sealectro Corp. is at 225 Hoyt St.

Chomerics Keyboards Marketed

WOBURN, Mass. – New encoded keyboards using conductive plastic technology are available from Chomerics Inc. at volume prices approaching 25 cents per key. The units, which feature conductive elastomer contacts, are available for evaluation in standard 12-key arrays for $9.50.

The units' encoded outputs do not require diodes or external logic circuitry, the firm said. Available with any number of keys on 3/4 in. centers, the units can be equipped with standard codes, such as Ascii, as well as custom and multiple codes.

Chomerics Inc. is at 77 Dragon Court.

Reader Lamp Announced

NEW YORK – A compact CdS sensor lamp unit, consisting of a sensor matrix, light source, and card insertion slot for reading punched holes of a card is available from Pansonic.

The Model CU-100 sensor unit is activiated by a flourescent lamp (4 Watt, 115 Vdc) and has an output large enough to drive DTL circuits without any amplification.

Pansonic is in the Pan Am Bldg.

Repco Transmitters Out

ORLANDO, Fla. – Repco Inc. has introduced new VHF-FM high-band (132-174 MHz) and mid-band (66-68 MHz) transmitters and receivers, designed for use as RF links in data acquisiton systems.

Suitable for recording, display, and command and control applications, the units are capable of handling voice frequencies and data transmission tones from 300 to 3,000 Hz, the firm said,

With a start-up time of 2 msec, the transmitters sell for approximately $170, while the receivers carry a price tag of $215 in quantities of one to 50.

Repco Inc. is at 1940 Lockwood Way.

Singer Thumbtracker Debuts

GLENDALE, Calif. – A miniature track ball control, the "Thumbtracker" Model 10-756-00-01, from Singer-Librascope can be used with a variety of display terminals for positioning cursors, Singer claims.

The unit contains a 1-in. track ball, which when rotated provides two-axis control of data outputs through two shaft-encoders integrated into the device. A complete revolution of the ball along a given axis provides 80 counts from the corresponding encoder.

Singer-Librascope is at 1100 Francis Court.

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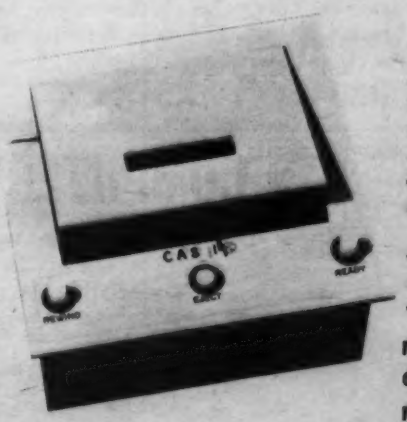

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Financial Roundup and Analysis

Leasing Companies React to IBM/370 Announcement

By Michael Merritt
CW Staff Writer

The reaction of leasing companies to IBM's announcement of the 370 is beginning to come in, and if anything, it's varied.

Leasco Data Processing's World Trade subsidiary has ordered two 155s and ten 165s for a total of $60 million.

The machines are for Leasco's time-sharing operations in Great Britain. This is apparently the most enthusiastic reaction of any of the leasing companies, and interestingly enough Leasco World Trade is not buying the 370s for normal releasing (a business it's not expanding) but rather for its own use in its time-sharing facility.

On the other hand, Paul W. Williams, Jr., president of Boothe Computer, one of the largest of the lessors, has said his company has no plans at all to order 370s.

Williams' charge is serious. "The ratio of rental to purchase price, including maintenance cost of the 370 series, negates serious consideration on the part either of a user or a lessor to purchase the new line."

Leasing Rates Higher

Williams lists two reasons for this statement. "The cost [of renting a 370] is approximately 160% of the rates leasing companies now charge for the 360 line. In these times of tight money and high interest rates, any widespread shift to costlier equipment is most unlikely.

"Furthermore, a large percentage of users are not yet taking full advantage of the power of the 360."

Modest Step

Dearborn Computer and Marine's President Arthur Weiss makes the point that is probably of most interest to leasing company owners. "In announcing the new System/370 line of computers, IBM has taken what many experts consider to be a relatively modest step forward in computer technology.

"Quite clearly, they have taken care to protect their enormous investment in System/360 computers now owned by them and leased to their customers. This protection, of course, extends also to other lessors of 360s, of which Dearborn is one."

Weiss also noted that the IBM 3330 disk drive, which he says "is considered essential for effective utilization of the new system," won't be available for over a year, another safety factor for the leasing companies.

IBM certainly does have "an enormous investment" in 360s, but because of its mind-boggling cash flow is certainly in no immediate danger of folding up because of technological innovation.

IBM Umbrella

The leasing companies, some of whom are in a good deal of trouble right now, are in an obviously different position financially.

They are tied in to 360s for at least another five years before the machines are fully depreciated, and the tight money situation forbids them all from making any extensive new purchases.

So IBM's unbrella continues to keep the rain off the leasing companies – unless a fantastic demand for 370s develops, which right now seems unlikely. Weiss claims that "increased [370] costs can be justified by increased capacity only if there is a *definite* need for increased capacity."

Boothe's Williams added that "the System/370 is really welcome news as far as we are concerned. The equipment is an extension of the 360 line and thus indicates that IBM's true "fourth generation" equipment is as far away as we had anticipated. Which means, in turn, that the IBM systems we have on lease will continue to be in demand by customers. We are confident that our original projection of the 360's lifespan will prevail."

Is Everybody Happy?

The 370 seems to be an elegant solution to IBM's problem of hypoing laggard sales while protecting all the golden 360s currently out on lease.

IBM can now offer upgrades to its market of choice, the big rich DP users, while at the same time avoid competing against itself by offering a machine an order of magnitude better than the 360. So IBM is happy and the leasing companies are happy, and nobody's out of business.

The person who has to pay for this, unfortunately, is the user, who has to be satisfied with a machine that belongs only to the new *gimmick* generation.

Finance

Control Data Operational New Income Plunges During 2nd Period, 1st Half

MINNEAPOLIS – Control Data Corp.'s computer operation continues to be a mid-summer nightmare, as CDC reported a second quarter and first half net income nose-dive from year-earlier levels.

Sales and revenues for the quarter were higher, thanks to an $8.3 million profit turned in by CDC subsidiary, Commercial Credit Co., but they declined in the six months. The company blames the steep plunge in computer profits on government cutbacks and a "harrowing" economic situation.

June quarter operating net dropped to $2.8 million, or 17 cents a share, from $13.1 million, or 89 cents a share a year earlier. Revenue in the quarter rose slightly, however, to $143.8 million from $141.6 million a year before.

Computer Operations Loss

Computer operations suffered a loss of $5.6 million in the quarter against a year-earlier profit of $5 million. Figures showed operations for the half incurred a deficit of $12.3 million compared with a year-earlier profit of $9.5 million.

Overall, the first half operating net declined to $4.5 million, or 26 cents a share, from $25 million, or $1.70 a share, a year earlier.

First half sales sustained a $4 million drop from last year.

Earlier this year, industry sources, including CDC, predicted the company would continue running its computer operations in the red.

According to William C. Norris, CDC chairman and president, the chances of seeing light in the tunnel this year seem slim. "Although we expect that the second half will show some improvement over the first," Norris said, "the year as a whole in the computer portion of our business won't be profitable.

"We have experienced some recent improvement in the rate of incoming orders, but many of these orders won't be shipped until 1971."

Although CDC finance operations helped stymie greater overall losses, earnings from Commercial Credit did slip to $16.8 million from $19 million.

Norris said it would not be possible to achieve goals originally set for the year because an expected reduction in high interest rates did not materialize.

"The profitability of credit insurance operations has been adversely affected by general economic conditions. "Additional credit facilities will also detract from our second half earnings," he said.

Raytheon Reports Lower Second Quarter Earnings

LEXINGTON, Mass. – Raytheon Company has reported earnings lower in the second quarter but higher in the first half than a year ago.

Earnings in the quarter ended June 28 were $8,928,000, equal after provision for preferred dividends to 60 cents a common share. This compares with restated earnings in the second quarter a year ago of $9,239,000 or 62 cents a common share. Sales in the second quarter totaled $317,272,000 compared with the restated $329,835,000 a year ago.

Raytheon President Thomas L. Phillips attributed the lower sales and earnings in the quarter to reduced volume in the company's components business, especially that segment serving the aerospace industry. "We are restructuring our components business to a lower volume of sales and expect to improve its profitability in the second half," he said.

First half earnings were $17,734,000, equal to $1.19 a common share on the average 14,356,659 shares outstanding during the period. This compares with restated earnings in the like period a year ago of $17,438,000 or $1.16 a common share on the average 14,367,731 shares then outstanding. Sales in the first half of 1970 were $624,418,000 compared with the restated $632,711,000 a year ago.

Pending clarification of the facts, Raytheon's second quarter earnings do not include provision for possible losses, estimated at a maximum of $3.4 million after taxes, resulting from the announced financial difficulties of Visual Electronics Corp. and its petition under the Bankruptcy Act.

Raytheon holds $5.8 million in partially subordinated promissory notes issued by Visual in exchange for the assets and business of Raytheon Learning Systems Co., a former division of Raytheon's D.C. Heath and Co. subsidiary.

Computer-Data-BHA Technical Set Becomes CDE Inc. Through Merger

JENKINTOWN, Pa. – Computer Data Enterprises, Inc. (CDE), and BHA Technical Services, Inc., New York, have completed their merger, according to Irwin J. Fredman, chairman of the board of the new corporation.

Robert Brodsky was elected president of the surviving company, CDE, Inc., which will maintain its offices in New York.

Immediate plans call for the expansion of CDE facilities to include development of a common user passenger check-in system for the air transport industry. Other expanded facilities will include a graphics department, architectural renderings, model making and photography for architects and engineers. First year volume is projected at about $2 million.

In its composite form, CDE, Inc. has two divisions providing a combined service of space planning and computer check-in systems as well as similar services for a wide spectrum of industry. C Tech Division is comprised of a staff of specialists with experience in the air transport industry, as well as optical scanning, proprietary software packages, and medical consulting systems.

D Tech Division is geared to servicing the needs of the architectural and engineering professions, including drafting, interior design, and purchase, coordination, construction and management services to the construction industry.

Telex Reports Hike In Earnings

TULSA, Okla. – The Telex Corp. reported sharply increased earnings over the corresponding period in the prior year.

Net income after taxes for the first quarter ending June 30, 1970 was $2,337,000, approximately three times the $771,000 recorded for the same period in the prior year.

Per share earnings on a fully diluted basis were 23 cents compared with last year's 8 cents per share. These per share amounts take into account the 5 for 1 stock split effective in May 1970.

Sales in the quarter just closed were $16,750,000, an increase of 77% over the $9,459,000 recorded for the same period last year.

The communications group's operations he said, are at approximately the same level of sales and profits are significantly better than last year.

PMI to Acquire CAI Programming Business In N.E.

NEW YORK – A recent announcement by Programming Methods, Inc. (PMI) that it has acquired certain assets of Computer Applications Inc. (CAI) suggests CAI has indeed fallen upon hard times.

After closing Speedata, an ill-fated subsidiary that had compiled losses in excess of $17 million, CAI has now turned over systems and programming activities previously handled by its Information Science Division to PMI for an undisclosed amount of cash. The activities relate to services rendered by CAI in the northeast.

While reasons for the turnover have not yet been given by CAI, the acquisition, according to PMI President George Langnas, should enhance PMI's capabilities in the areas of statistical analysis, financial systems, and municipal services.

Honeywell/GE Merger Cancels Plans For Computer Plant In N.E. Town

By Edward J. Bride
CW Staff Writer

FRANKLIN, Mass. – A sigh of regret ascended from this town of 17,000 when Honeywell and GE decided to merge their computer divisions.

Up until that time, the town's claim to fame was Dean Junior College, open in 1865 and currently the home of the town's only computer.

Honeywell had been planning to build a 250,000-sq-ft plant here to produce computer control parts.

Dean still has the computer, but Honeywell's plans have changed. A company spokesman is reported to have told town officials that, if the merger goes through, "and we fully expect it will, we'll need a new plant in Franklin like a hole in the head."

About 1,200 people were to be employed in the new factory. The rapidly expanding suburban town hailed the anticipated broader tax base, and the industrialization without pollution which such a plant could have brought.

About two weeks after GE and Honeywell reaffirmed their merger intentions, citizens were informed that their tax rate had been raised $3, from $41 to $44, a moderate increase in a state that residents not-so-affably call "Taxachusetts."

Industrial Park Dormant

Honeywell's location here would have given a much-needed boost to the dormant industrial park.

Although the computer factory would not have been built near the park, it would have focused attention on the availability of property, and on the park's proximity to Boston and to two interstate routes, one bordering the park, the other less than 15 miles away.

Approved over two years ago, the park awaits its first business, which in turn awaits the relocation of a state highway running through the "center" of town.

So, as the editor of Franklin's weekly newspaper put it, other industry can look on this incident, noting that a major electronics company had chosen Franklin over other towns and, except for the merger, would have located here.

Vitro Turns to Commercial Users As Government Time Sharing Feels Cuts

CW Washington Bureau

WASHINGTON, D.C. – A suburban Washington, D.C., manufacturing firm has moved to plug some financial gaps caused by the growing cutback in defense spending by launching a commercial time-sharing service to keep its substantial amount of on-site hardware busy.

The firm, Vitro Laboratories, Silver Spring, Md.-based subsidiary of Automation Industries, Inc. of Los Angeles, recently began offering ATS/360 remote terminal service to potential customers at competitive rates.

The firm uses an IBM 360/65 with a Model 40 in backup. IBM 2741 and Datel 30 terminals can be used with the system. Vitro's data processing facility, which employs approximately 170, also includes a 360/30, IBM 70/90 and a CalComp 763/780 plotter.

The company's range of services covers the usual remote type jobs – text editing, general data storage and retrieval.

Dr. Robert C. Stroh, head of the program, noted that the new service was inaugurated primarily as a result of reductions in defense spending which have left the firm with excess computer time.

No new customers have been signed up yet, but he said he is optimistic about the market, particularly because of the firm's pricing schedule. Subscribers are charged a $75 monthly minimum, $3/hr connect time, and $1.50 per thousand records I/O.

New Registrations

WELLINGTON COMPUTER SYSTEMS INC., 405 Lexington Ave., New York, a company engaged in a wide range of data processing and related computer software services for users of EDP equipment, filed to register 51,500 shares of common stock. These shares may be offered for sale at $15 per share maximum. No underwriter is involved.

FOTO-MEM, INC., 6 Strathmore Road, Natick, Mass., a company engaged in the design, manufacture and marketing of photo-optical random access memory systems, a small digital computer, a CRT display terminal, a non-impact printer, and microfiche viewer, filed to register $4 million of convertible subordinated debentures, due 1985, to be offered for public sale at 100% of principal amount. Also included in this statement are 20,000 outstanding shares of common stock which may be offered for sale by the holder at prices current at the time of sale ($20 per share maximum).

Proceeds will be used for materials, components and labor for the manufacture of present products, for continued research and development, and for marketing and advertising. The balance will be added to the company's working capital and used for general corporate purposes. The underwriters will be headed by S.D. Fuller & Co., 26 Broadway, New York, N.Y.

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Firm Formed to Find Moneyed Men For Capital Starved Computer Cos.

WHITE PLAINS, N.Y. – An investment service organization that hopes to span two distinct yet compatible segments of the business community – DP companies seeking funds, and investors seeking opportunities – was recently formed. Co-founders of the new firm, called Capital Structures, Inc., are Peter E. Heller, president, and John S. Ransom, executive vice-president.

According to Heller, former director and seniro vice-president at Walter E. Heller & Company, an independent commercial financing organization, "Tight money and uncertain economic conditions have cast an entirely different light on the funding of new and emerging companies as well as those companies seeking to expand.

"In easier money times, the public, financial institutions, and commercial banks were paramount in the funding process. Since these sources of capital and credit have contracted, many investment opportunities are just treading water, with emphasis shifting back to the more traditional source of early investment, the private investor, who is often not as affected by current economic conditions."

Ransom, who spent 16 years with IBM (eight years as a member of the corporate marketing staff), added, "As companies move away from dependence on public markets toward the sophistication of private investors, the need for sound business plans and creative financing approaches becomes a major strategy in acquiring fundings."

IDC Suit Claims DP Data Copied Trade Secrets

NEWTON, Mass. – International Data Corp. (IDC) has filed suit against DP Data Corp., Marlboro, Mass. charging violation of trade secret and proprietary rights.

The suit claims DP Data copied the June 1966 edition of the EDC domestic computer installation file, which represents an investment of more than $1 million. The file, IDC says, is the largest single data bank of information on computer installations available anywhere.

IDC also has obtained an order temporarily restraining DP Data from any further sales, disclosures or distributions of the file. DP Data could not be reached for comment.

Acquisitions

Systems Engineering Laboratories, Inc., Fort Lauderdale, Fla., and **Computer Peripherals Corp.** of San Diego have approved a formal agreement whereby Systems will acquire Computer Peripherals. Systems is a manufacturer of real-time digital computers, custom systems, and keyboard data entry systems. Computer Peripherals is a manufacturer of head-per-track disk units. Under terms of the agreement, Systems will acquire Computer Peripherals for approximately 122,000 shares of its common stock.

Remote Computing Corp. has sold **Computer Control Corp.** of Southfield, Mich., for an undisclosed amount. Computer Control provides DP services in the areas of municipal and hospital accounting. The firm has been reorganized under the name Computer Control Corp. of Michigan.

Standard Computer Corp., Santa Ana, Calif., and **Call-A-Computer, Inc.** of Minneapolis, have completed merger negotiations. Standard issued about 1,090,000 shares for Call-A-Computer, which will operate as a wholly owned subsidiary of Standard.

Standard manufactures large-scale microporgrammed computers; Call-A-Computer provides time-sharing services from six regional centers.

Auto-Graphics, Inc. of Los Angeles has reached agreement in principle on acquisition of **Compuscan Input Services, Inc.** of Dayton, Ohio. Auto-Graphics is in the field of computer typesetting. Compuscan is active in conversion of libraries to automation and in optical character recognition.

Mecca Computer Systems, Inc., Oklahoma City, has acquired most of the assets of **Medical Consultants of America, Inc.**, also of Oklahoma City, for an undisclosed amount of cash and Mecca stock.

Medical Data Services, Inc. and **Charter Medical Corp.** have agreed to merge. Terms of the agreement were not disclosed. Medical Data provides DP and business-management services to hospitals, physicians, dentists, and group medical practices.

Clary Corp. and **Addmaster Corp.** of San Gabriel, Calif., have agreed in principle to merge into a new company. Under the terms of the agreement the exchange of stock would be three-to-one in favor of the Addmaster shares. The surviving company has not yet been determined.

Automatic Data Processing, Inc. (ADP) has reached agreements in principle to acquire **Keystroke Services, Inc.** of Atlanta, Ga., and **Computer Data Prep, Inc.**, Stamford, Conn.

Under the terms of the agreements, Keystroke will be acquired for an undisclosed amount of cash and accounted for as a purchase, while Computer Data Prep, Inc. will be acquired for an undisclosed amount of stock and accounted for on a pooling-of-interests basis.

Keystroke Services will be known as Automatic Data Processing of Atlanta, Inc., and Computer Data Prep will be known as Automatic Data Processing of SW Connecticut, Inc.

Azrex, Inc., Burlington, Mass., has acquired **Wolf R&D Corp.'s** Boston Division from EG&G, Inc. The new firm will operate as a hybrid with one division performing consulting-programming services and the other division distributing proprietary computer programs.

The proposed acquisition of **Executive Data Systems, Inc.**, Cedar Rapids, Iowa, by **Compucare, Inc.** has been approved by the boards of directors of both companies, and is scheduled for submittal to stockholders. Compucare, based in Chicago, will complete the transaction by issuing convertible preferred shares.

The transaction would add Executive Data Systems' computerized accounting services to Compucare's patient-oriented information systems.

Arcata National Corp. has acquired four communications companies: **Continental Communications Construction Corp.**, Tampa; **Communications Management Inc.**, Seattle; **Audio Center Inc.**, Houston; and **Teladept Industries Inc.**, Newark.

Arcata has agreed in principle to acquire **Mainline Communications Inc.**, Cleveland. Continental Communications Construction Corp. and Communications Management will operate as autonomous subsidiaries of Arcata National. Audio Center, Teladept, and Mainline Communications will be merged into Arcata's new subsidiary, Arcata Communications.

American Information Systems, Inc., Dayton, Ohio, has merged with **Micro-Data Corp.**, a 10-year-old company specializing in microfilm systems. The resulting company will specialize in all forms of information processing involving both computers and microfilm.

Compata, Inc. has acquired the assets of **Synergetic Sciences, Inc.** on an exchange of stock basis, effective July 1, 1970. Synergetic Sciences will operate as a wholly owned subsidiary.

Compata provides consulting services; Synergetic Sciences, Tarzana, Calif., is engaged in systems analysis and engineering of complex systems and has developed proprietary programs for the financial community.

Affiliation Betters Medical Care EDP

NEW YORK – Astradyne Computer Industries Inc. has acquired marketing rights to the EDP Financial Management Systems developed by SDK Medical Computer Services Corp. for hospitals, nursing homes and extended care facilities in N.Y., N.J., Pa., and Conn.

According to Seymour Eagel, president of Astradyne, the affiliation will enable medical care facilities to enjoy "the benefits of a sophisticated EDP system without the burdens of an in-house computer operation."

TRADE*QUOTES

Computerworld Stock Trading Summary

All statistics compiled, computed and formatted by TRADE*QUOTES Division of National Information Services, Inc. Cambridge, Mass. 02139

CLOSING PRICES THURSDAY, JULY 30, 1970

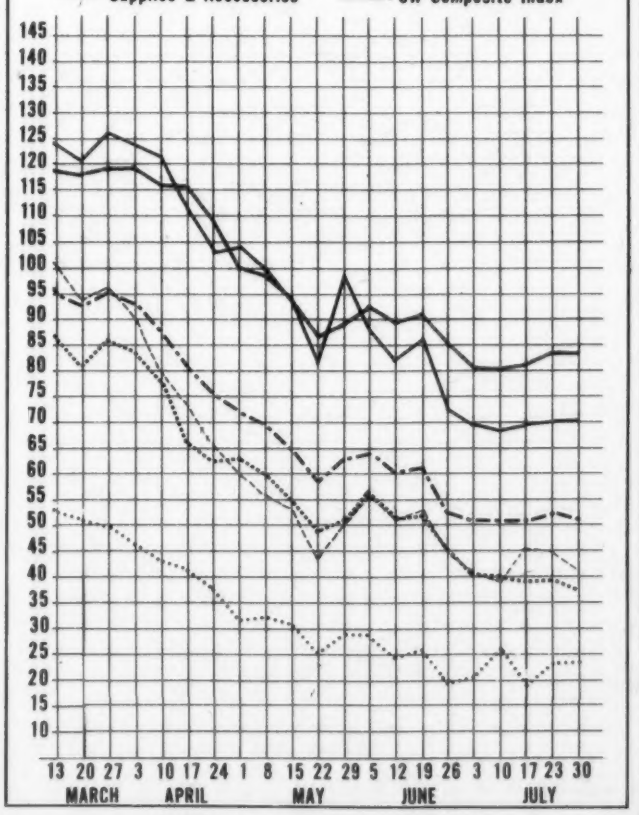
EXCH		1970 RANGE (1)	CLOSE JULY 30 1970	WEEK NET CHNGE	WEEK PCT CHNGE
	SOFTWARE & EDP SERVICES				
O	ADVANCED COMP TECH	1- 6	1 1/4	- 1/2	-28.5
A	APPLIED DATA RES.	4- 24	4 5/8	- 1/8	-2.6
O	APPLIED LOGIC	3- 19	3 1/8	+ 3/8	+13.6
O	ARIES	1- 6	1 3/8	- 1/4	-15.3
A	AUTOMATIC DATA PROC	23- 47	32	+ 3/8	+1.1
O	AUTO SCIENCES	5- 14	6 3/4	-1	-12.9
O	BRANDON APPLIED SYS	1- 9	1 1/2	-1	-40.0
O	COMPUTER AGE INDUS.	1- 3	1	- 1/8	-11.1
A	COMPUTER APPL	2- 12	2 7/8	- 1/8	-4.1
O	COMPUTER ENVIRON	3- 14	2 3/4	+ 1/4	+10.0
N	COMPUTER INDUS.	2- 10	5	0	0.0
O	COMPUTER NETWORK	3- 14	7	- 1/2	-6.6
O	COMPUTER PROPERTY	6- 15	6 3/4	+ 1/4	+3.8
N	COMPUTER SCIENCES	7- 34	7 3/8	-1 3/8	-15.7
O	COMPUTER USAGE	2- 8	2 1/4	+ 1/4	+12.5
A	COMPUTING & SOFTWARE	16- 75	22 1/8	+1 5/8	+7.9
O	COMRESS	2- 10	2 3/4	+ 1/8	+4.7
O	COMSHARE	3- 15	3 1/4	0	0.0
O	CONSOL. ANAL. CENT.	1- 3	1	0	0.0
O	DATA AUTOMATION	3- 24	2 5/8	- 1/8	-4.5
O	DATA PACKAGING	5- 29	7	+ 1/2	+7.6
O	DATAMATION SERVICE	1- 6	1 5/8	- 1/8	-7.1
O	DATATAB	5- 9	5 7/8	- 1/8	-2.0
O	DIGITEK	2- 5	2 1/2	+ 3/4	+42.8
O	EDP RESOURCES	5- 13	5 3/4	+ 1/4	+4.5
A	ELECT COMP PROG	4- 11	5 3/4	+ 1/4	+7.1
O	ELECTRONIC DATA SYS.	51-161	53	+2	+3.9
O	INFORMATICS	4- 21	4 1/2	- 3/8	-7.6
A	ITEL	6- 26	8 3/8	- 3/4	-8.2
O	LEVIN-TOWNSEND SERV.	1- 13	2 1/4	+ 3/4	+50.0
A	MANAGEMENT DATA	9- 25	9 1/2	+ 1/2	+5.5
O	NAT COMP ANALYSTS	2- 8	3 7/8	- 1/8	-3.1
O	NAT.COMP. SERV.	3- 12	6 1/4	- 1/2	-7.4
N	PLANNING RESEARCH	13- 54	15 3/4	- 1/2	-3.0
O	PROGRAMMING METHODS	9- 27	10	+ 1/2	+5.2
O	PROGRAMMING & SYS	2- 5	2	- 5/8	-23.8
O	PROGRAMMING SCIENCES	2- 33	2 1/2	- 1/4	-9.0
N	SCIENTIFIC RESOURCES	2- 22	2 3/4	0	0.0
O	SOFTWARE SYSTEMS	1- 2	+ 1/2	- 1/8	-20.0
O	TBS COMPUTER CENTERS	6- 27	8 1/2	+1 1/2	+21.4
O	UNITED DATA CENTER	2- 4	2 1/4	+ 1/4	+12.5
N	UNIVERSITY COMPUTING	19- 99	20 1/2	-1 1/2	-6.8
A	URS SYSTEMS	5- 21	5 1/4	- 3/8	-6.6
O	U.S. TIME SHARING	3- 14	3 3/8	- 1/8	-3.5
	PERIPHERALS & SUBSYSTEMS				
N	ADDRESSOGRAPH-MULT	21- 62	25 3/4	- 1/2	-1.9
O	ALPHANUMERIC	2- 15	3 5/8	- 1/2	-12.1
N	AMPEX CORP	13- 48	15 3/8	- 5/8	-3.9
A	ASTRODATA	5- 34	5 1/8	- 3/8	-6.8
O	BOLT,BERANEK & NEW	3- 11	6 1/2	+ 1/4	+4.0
N	BUNKER-RAMO	6- 14	7 3/8	+ 3/8	+5.3
A	CALCOMP	13- 33	14 1/8	- 7/8	-5.8
O	CUGNITRONICS	4- 13	5 5/8	- 1/8	-3.3
O	COLORADO INSTRUMENTS	4- 13	4 7/8	0	0.0
O	COMPUTER COMMUN.	7- 36	6 1/2	0	0.0
A	COMPUTER EQUIPMENT	4- 12	4 5/8	- 1/4	-5.4
A	COMPUTEST	13- 28	17 1/2	- 1/4	-1.4
A	DATA PRODUCTS CORP	7- 26	7 1/8	- 1/4	-3.3
O	DATA TECHNOLOGY	6- 23	6 3/8	- 1/8	-1.9
O	DIGITRONICS	5- 13	5 1/4	- 1/4	-4.5
N	ELECTRONIC M & M	7- 40	8 1/8	+ 1/4	+3.1
O	FABRI-TEK	3- 8	4	- 1/4	-5.8
O	FARRINGTON MFG	2- 17	2 5/8	- 1/8	-4.5
O	INFORMATION DISPLAYS	6- 20	5 3/4	+ 1/4	+4.5
A	MARSHALL INDUSTRIES	14- 67	16	-1 1/4	-7.2
A	MILGO ELECTRONICS	15- 84	21 5/8	+1 5/8	+8.1
N	MOHAWK DATA SCI	19- 87	20 3/4	-1 1/2	-6.7
O	OPTICAL SCANNING	15- 52	17	0	0.0
O	PHOTON	4- 17	7 5/8	+2 5/8	+52.5
O	PHOTO-MAGNETIC SYS.	1- 4	1 3/8	- 3/8	-21.4
A	POTTER INSTRUMENT	15- 42	17 3/8	+2	+13.0
O	PRECISION INST.	7- 25	9 3/4	- 3/4	-7.1
O	RECOGNITION EQUIP	15- 83	15 3/4	-2 1/4	-12.5
O	REDCOR CORP.	5- 34	4 1/2	- 3/4	-14.2
N	SANDERS ASSOCIATES	7- 29	9 3/4	- 1/4	-2.5
O	SCAN DATA	7- 53	8	+ 1/2	+6.6
O	TALLY CORP.	10- 23	12 1/4	+ 1/4	+2.0
N	TELEX	11- 25	11 7/8	-1 3/8	-10.3
O	VIATRON	6- 51	5 1/2	- 1/2	-8.3
	SUPPLIES & ACCESSORIES				
N	ADAMS-MILLIS CORP	8- 15	10 7/8	- 3/8	-3.3
O	BALTIMORE BUS FORMS	11- 21	11	0	0.0
A	BARRY WRIGHT	6- 25	8 5/8	- 1/2	-5.4
A	DATA DOCUMENTS	15- 35	16 3/4	- 1/4	-1.4
N	ENNIS BUS. FORMS	11- 19	13 1/2	- 1/2	-3.5
O	GRAPHIC CONTROLS	8- 17	7 3/4	-1 1/2	-16.2
N	MEMOREX	53-166	53 1/2	-3 1/4	-5.7
N	3M COMPANY	71-114	80 3/4	- 5/8	-0.7
O	MOORE BUS. FORMS	27- 38	29 1/2	+ 1/2	+1.7
N	NASHUA CORP	21- 43	29 1/2	+4 1/2	+18.0
O	REYNOLDS & REYNOLD	25- 48	30 1/2	+2	+7.0
O	STANDARD REGISTER	20- 30	21 1/4	+ 1/4	+1.1
N	UARCO	22- 39	25 3/4	+ 3/4	+3.0
A	WABASH MAGNETICS	8- 30	9 1/8	+ 7/8	+10.6
O	WALLACE BUS FORMS	29- 41	32 3/4	+ 1/4	+0.7

CLOSING PRICES THURSDAY, JULY 30, 1970

EXCH		1970 RANGE (1)	CLOSE JULY 30 1970	WEEK NET CHNGE	WEEK PCT CHNGE
	COMPUTER SYSTEMS				
N	BURROUGHS CORP	78-173	96 7/8	+1 5/8	+1.7
N	COLLINS RADIO	9- 37	11 5/8	-1	-7.9
N	CONTROL DATA CORP	30-122	32	+1 1/8	+3.6
A	DIGITAL EQUIPMENT	50-124	54 3/4	+ 3/4	+1.3
N	ELECTRONIC ASSOC.	3- 11	4 3/8	- 1/8	-2.7
A	ELECTRONIC ENGINEER.	3- 14	5 1/4	+ 5/8	+13.5
N	FOXBORO	18- 39	20 7/8	+1 1/4	+6.3
O	GENERAL AUTOMATION	9- 42	12	- 3/4	-5.8
N	GENERAL ELECTRIC	60- 77	77 1/8	+1 1/8	+1.4
N	HEWLETT-PACKARD CO	20- 45	22 1/2	0	0.0
N	HONEYWELL INC	65-152	75	0	0.0
N	IBM	237-387	253 1/2	-3 1/2	-1.3
N	NCR	33- 86	35 5/8	+1 7/8	+5.5
N	RCA	18- 34	23 3/8	+2 1/2	+11.9
N	RAYTHEON CO	16- 35	17 3/4	-1 1/2	-7.7
O	SCI. CONTROL CORP.	1- 8	1 5/8	- 1/4	-13.3
N	SPERRY RAND	23- 40	23 1/2	-3	-11.3
A	SYSTEMS ENG. LABS	10- 49	13 1/4	+ 1/8	+0.9
N	VARIAN ASSOCIATES	9- 29	10 1/2	0	0.0
A	WANG LABS.	18- 51	24	+3 7/8	+19.2
N	XEROX CORP	70-115	74 3/4	- 7/8	-1.1
	LEASING COMPANIES				
O	BOOTHE COMPUTER	3- 25	8 3/4	- 1/4	-2.7
O	BRESNAHAN COMP.	4- 9	3 1/2	- 3/8	-9.6
O	COMPUTER EXCHANGE	2- 6	6	+1	+20.0
O	COMPUTER LEASING	4- 18	5	0	0.0
N	DATA PROC. F & G	6- 32	8 1/2	- 1/4	-2.8
O	DATRONIC RENTAL	2- 8	2 7/8	- 1/8	-4.1
A	DEARBORN COMPUTER	10- 24	15 1/4	+1 5/8	+11.9
O	DIEBOLD COMP. LEAS.	2- 8	3	- 1/4	-7.6
A	DPA, INC.	3- 10	3 5/8	- 1/4	-6.4
A	GRANITE MGT	7- 22	10 1/2	- 1/2	-4.5
A	GREYHOUND COMPUTER	3- 44	5 3/4	- 1/4	-4.1
N	LEASCO DATA PROC.	7- 30	9 1/8	+ 1/8	+1.3
O	LECTRO COMP LEAS	2- 5	2 3/8	- 3/8	-13.6
A	LEVIN-TOWNSEND CMP	3- 19	4 1/4	+ 1/4	+6.2
O	LMC DATA, INC.	1- 3	1 1/2	+ 1/8	+9.0
O	MANAGEMENT ASSIST	1- 4	1 1/2	0	0.0
O	NCC LEASING	3- 8	3 7/8	0	0.0
O	SYSTEMS CAPITAL	2- 8	2 3/4	- 1/4	-8.3
A	U.S. LEASING	3- 19	15	+ 1/4	+1.9

EXCH: N=NEW YORK EXCHANGE; A=AMERICAN EXCHANGE
L=NATIONAL EXCHANGE; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

Computer Stocks Trading Index



BASE FOR EACH TRADING INDEX: 100 as of 3/1/68

Earnings Report

RAYTHEON
Three Months Ended June 28

	1970	a1969
Shr Ernd	$.60	$.62
Revenue	317,272,000	329,835,000
Earnings	8,928,000	9,239,000
6 Mo Shr Ernd	1.19	1.16
Revenue	624,418,000	632,711,000
Earnings	17,734,000	17,438,000

a-Restated to reflect operations of United Engineers & Constructors Inc., acquired in December, 1969.
Fully diluted share earnings were 57 cents for the quarter and $1.13 for the six month period of 1970 compared with 59 cents and $1.11 respectively, in the periods of 1969.

STANDARD REGISTER CO.
Three Months Ended June 30

	1970	a1969
Shr Ernd	$.35	$.41
Revenue	24,602,653	25,240,890
Earnings	762,626	879,071
6 Mo Shr Ernd	1.00	.97
Revenue	52,234,709	50,943,303
Earnings	2,151,971	2,085,954

a-Restated for tax adjustment.

ELECTRONICS MEMORIES & MAGNETICS
Six Months Ended June 27

	1970	a1969
Shr Ernd	$.21	$.46
Revenue	47,736,000	44,180,000
Earnings	1,567,000	2,839,000

a-Restated for acquisition on a pooling-of-interests basis.

AMERICAN RESEARCH & DEV.
Year Ended June 30

	1970	1969
Asset, Shr	$52.41	a$66.39
Net Assets	321,786,189	407,646,106

a-Adjusted to reflect four-for-one stock split in July, 1969.

DIGITRONICS CORP.
Year Ended March 31

	1970	1969
aShr Ernd	$.11	$.20
Revenue	17,558,917	16,363,809
Earnings	307,731	587,080
Tax Cred	334,715	443,586
bNet Earn	642,446	1,030,666

a-Based on income before tax credits. b-Equal to 22 cents a share in 1970 and 35 cents a share in 1969.

NATIONAL CASH REGISTER
Three Months Ended June 30

	1970	1969
aShr Ernd	$.48	b$.50
Revenue	344,045,000	308,995,000
Earnings	10,432,000	10,845,000
a6 Mo Shr	.86	b.81
Revenue	649,122,000	573,756,000
Earnings	18,581,000	17,361,000

a-On a fully diluted basis. b-Adjusted for a two-for-one stock split in May, 1970.

COMPUTER MACHINING TECHN.
Nine Months Ended May 31

	1970	1969
aShr Ernd	$.05	.....
Revenue	1,783,249	$2,459,000
Earnings (Loss)	16,769	(66,854)
Spec Cred	10,757	.....
Earnings (Loss)	b27,526	(66,854)

a-Based on income before special credits. b-Equal to 8 cents a share.

DIEBOLD INC.
Six Months Ended June 30

	1970	1969
Shr Ernd	$1.47	$1.10
Revenue	69,378,878	57,127,629
Earnings	4,369,873	3,228,641

HONEYWELL, INC.
Three Months Ended June 30

	1970	1969
Shr Ernd	$.96	$.95
Revenue	381,300,000	346,400,000
Earnings	15,100,000	14,200,000
6 Mo Shr	1.86	1.75
Revenue	746,000,000	671,400,000
Earnings	28,900,000	26,000,000

PROGRAMMED & REMOTE SYSTEMS
Year Ended April 30

	a1970	1969
Shr Ernd	$.10	$.08
Revenue	1,514,690	1,195,239
Earnings	41,695	31,291

a-Preliminary.

ADAMS-MILLIS CORP.
Six Months Ended June 30

	1970	1969
Shr Ernd	$.63	$.45
Revenue	26,672,372	20,243,571
Earnings	1,205,686	852,290

Results for both years include operations of Macon Machine Co., acquired on a pooling-of-interest basis in February, 1970.

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